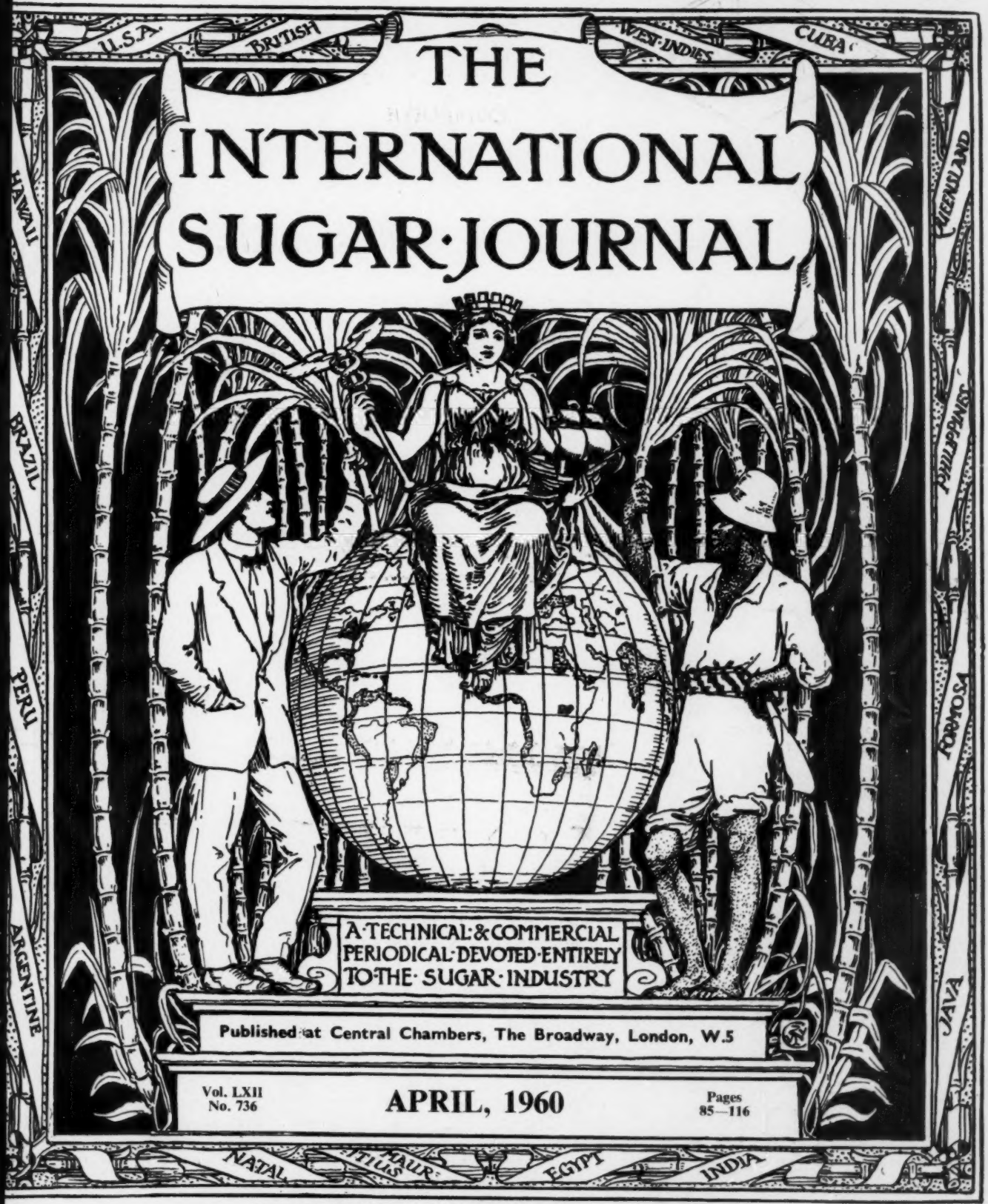
2s 6d or 45 cents net
Annual Subscription £1 12s or $5·00 Post Free



THE INTERNATIONAL SUGAR·JOURNAL

A·TECHNICAL·&·COMMERCIAL PERIODICAL·DEVOTED·ENTIRELY TO·THE·SUGAR·INDUSTRY

Published at Central Chambers, The Broadway, London, W.5

Vol. LXII
No. 736

APRIL, 1960

Pages
85—116

For LIST OF ADVERTISERS see page lii

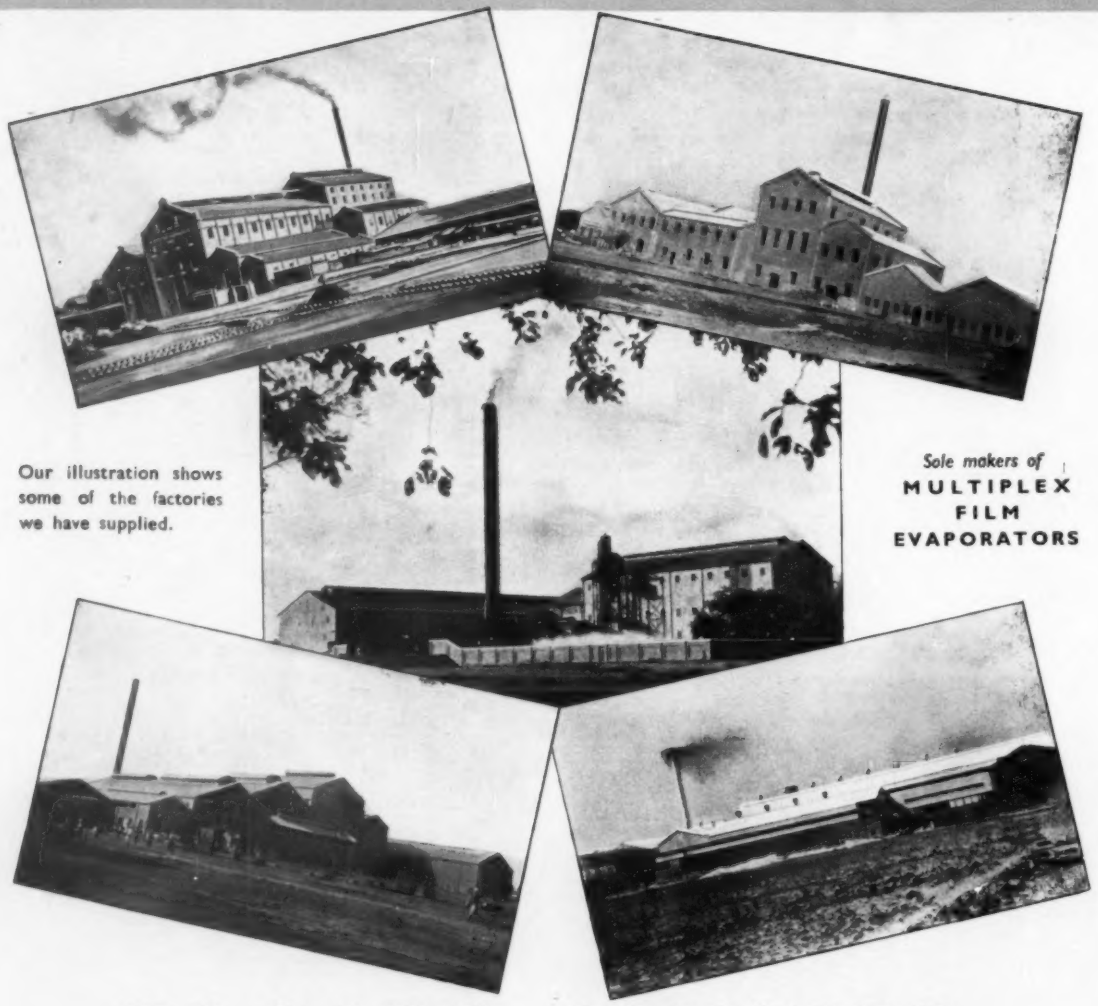
BLAIRS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS



Our illustration shows some of the factories we have supplied.

Sole makers of
MULTIPLEX FILM EVAPORATORS

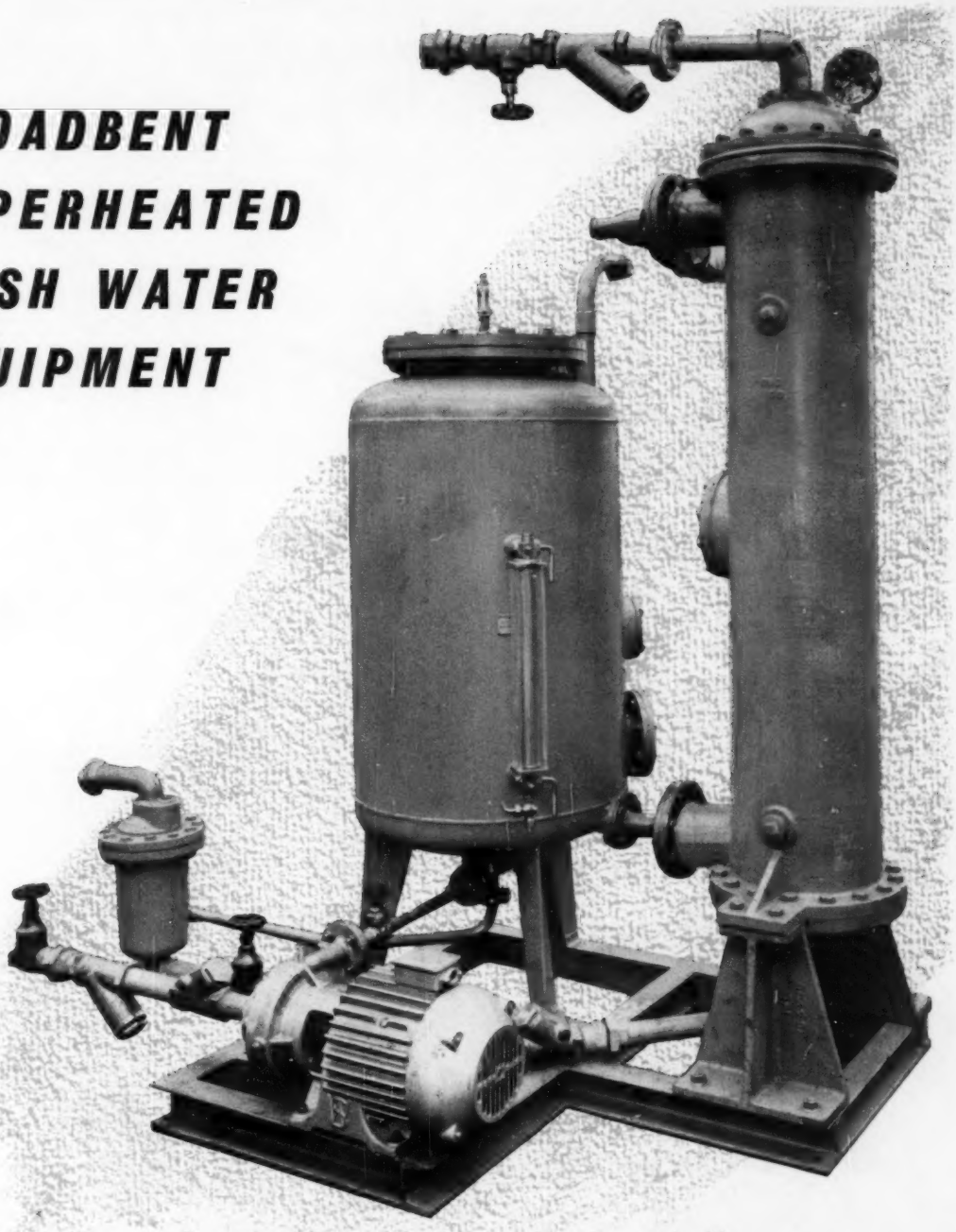
BLAIRS LIMITED

WOODVILLE STREET · GLASGOW S.W. 1

Cables : "BLAZON GLASGOW"

London Office: **38 Grosvenor Gardens, S.W.1** *Cables* : "Multivap Sowest London"

BROADBENT SUPERHEATED WASH WATER EQUIPMENT



Our range of accessories has now been increased with new AUTOMATIC SUPERHEATED WASH WATER EQUIPMENT.

The unit illustrated supplies 1400 g.p.h. of water at 75 lb/p.s.i.g. with a temperature rise from 60° to 115°C when supplied with steam at 60 lb/p.s.i.g.

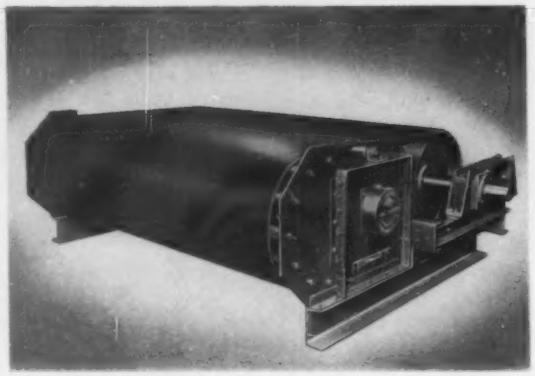
BROADBENT

THOMAS BROADBENT & SONS LTD . CENTRAL IRONWORKS . HUDDERSFIELD . ENGLAND

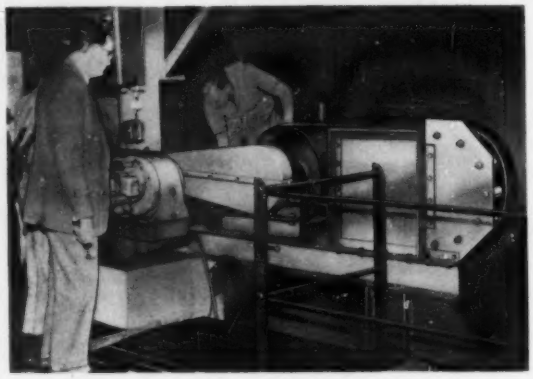
The World's largest manufacturer concentrating entirely on industrial centrifugals

Telephone 5520-5 *Telegrams: BROADBENT HUDDERSFIELD*

MAGNETIC CONVEYOR HEAD



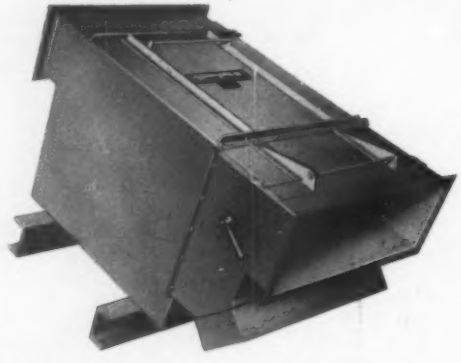
Boxmag patent MH. 2484. Conveyor Head built into an 84" wide short belt conveyor, photographed prior to despatch. The machine is designed for installation, as shown on the adjacent illustration.



Boxmag patent MH. 2484 installed in the chute between a sugar cane carrier and crusher, at a factory in Mauritius. It is designed to remove tramp metal automatically and continuously without an operator's attention. (write for leaflet 62/2).

MAGNETIC SEPARATORS PROTECT MACHINERY AND PRODUCTS

(Write for further details)



Boxmag Superflux Magnetic Chute for removal of ferrous contamination from refined sugar to decontaminate the product.

A Boxmag Unimajor block type Permanent Magnet. One of the many types of separators suitable for general applications in sugar factories. (write for details of full range).

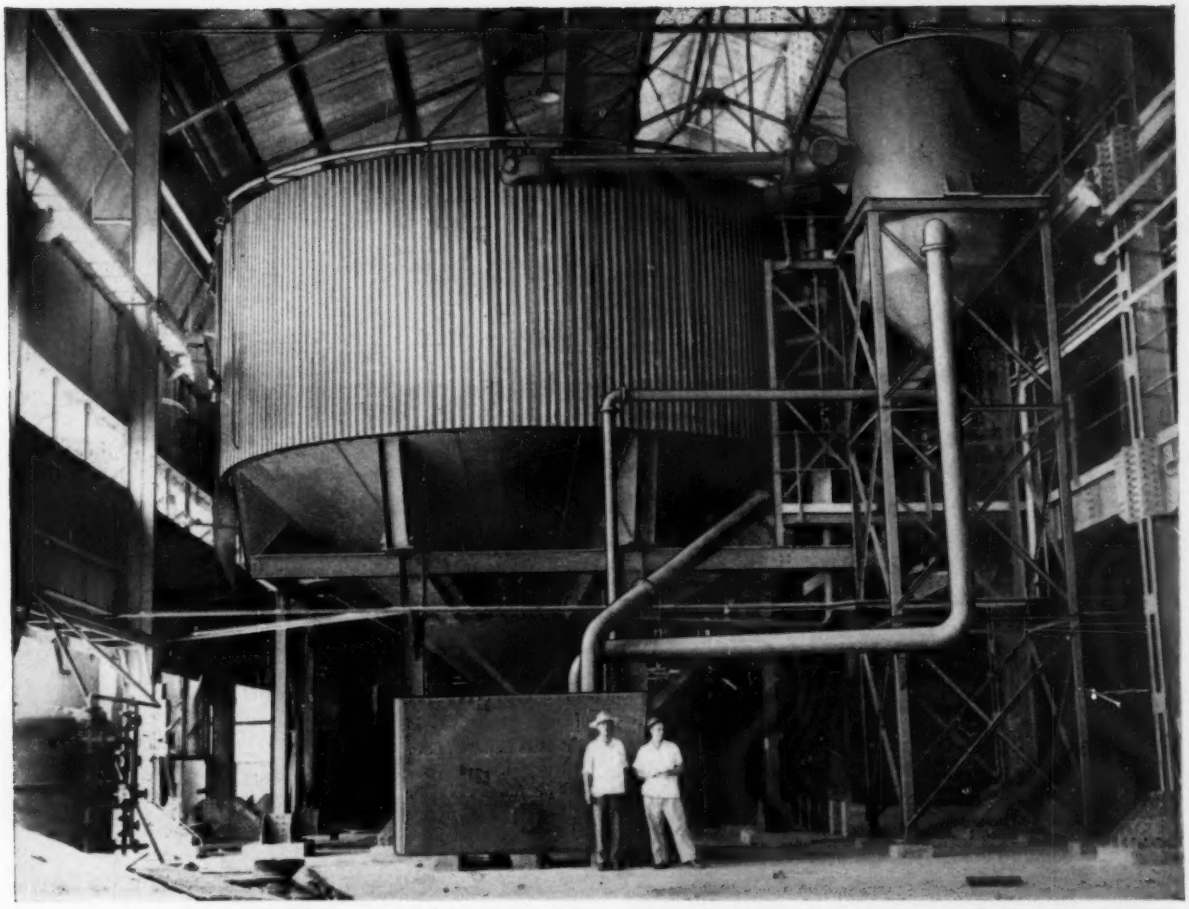
BOXMAG

Telephone
Central 5391

Telegrams :
Boxmag Birmingham

ELECTROMAGNETS LTD

BOXMAG WORKS • BOND ST. • HOCKLEY • BIRMINGHAM 19 • ENGLAND



'Mirrlees'

BACH CONTINUOUS SUBSIDERS

Illustrated is one of our most recent installations, a 30 feet, 5 tray Subsider in operation in Venezuela.

This Subsider enables juice to be drawn off at 5 points of optimum clarity. Surface evaporation is obviated, no surface scum enters the tank, and a high temperature is maintained throughout the apparatus.

SEALED 'Mirrlees' 'Bach' CLARIFICATION

The MIRRLEES WATSON COMPANY LIMITED

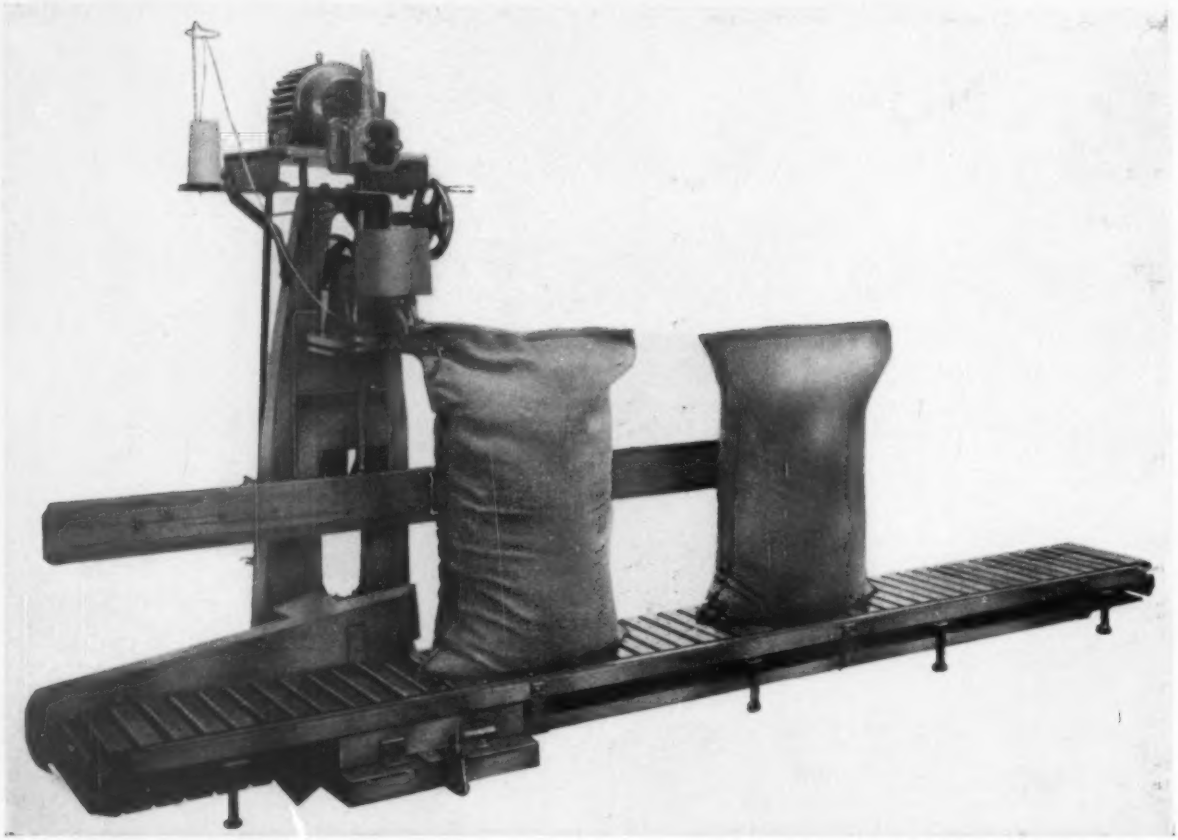
SCOTLAND STREET GLASGOW, C.5

London Office: 38 GROSVENOR GARDENS, S.W.1

The 'Super' Universal Sack Closing Machine

MODEL NO. 5B

Fitted with 10 or 12 ft. Conveyor and Special Clutch Drive



This machine is fitted with a conveyor 10 or 12 ft. overall and a Special Clutch Drive which allows the conveyor to be run independently of the sewing head.

Jute, Hessian, Paper Lined Hessian, Cotton and Paper Sacks weighing from 50 to 325 lbs. can be sewn on this machine.

Machines can be seen working by appointment.

Power required 2 *h.p.* *Shipping weight :* 14 *cwts.*

Manufactured in Great Britain by:

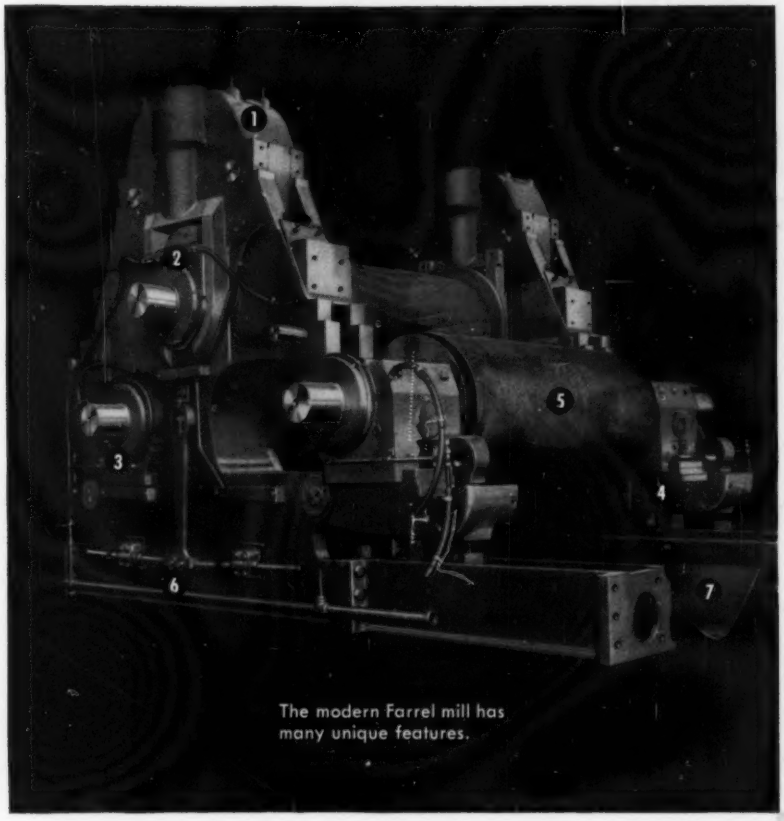
The Sack Filling & Sewing Machine Syndicate Limited

(Timewell's Patent)

TIMEWELL WORKS · LOCKFIELD AVENUE · BRIMSDOWN · ENFIELD . MIDDX.

Telephone : HOWARD 1188 *Telegrams :* FECIT, ENFIELD

What makes this grinding equipment the most efficient you can buy?



The modern Farrel mill has many unique features.

1 Simplified top-cap construction permits vertical removal of roll without sidewise motion. Caps held securely in alignment by two heavy pins.

2 Heavy-duty top-roll bearings are made of best-grade bearing bronze and are water-cooled.

3 Side-roll bearings are of bronze half-liner construction mounted in rigid Meehanite® boxes. Journal cover and patented juice-seal ring prevent entry of juice, bagacillo and water into the side-roll boxes, protecting journals against corrosion.

4 Swinging side caps greatly simplify the job of changing side rolls. Also reduce hazard of handling heavy rolls because side rolls, as well as top roll, can be lifted vertically.

5 Rolls made of special iron with open grain and rough texture. Exceptional gripping and feeding capacity result in maximum extraction and tonnage.

6 One-piece housing and bedplate eliminates joint, increases strength and rigidity.

7 Corrosion-resistant juice pans of Everdur®, or stainless-steel clad, in single-V, double-V, or flat types with drag construction.

Continual design refinement for Farrel mills!

Since 1872, when Farrel first started building sugar mills, the company has never considered as fixed or final any of the designs that have been created. Effort has been continuous to improve every detail—from cane knives to final bagasse discharge.

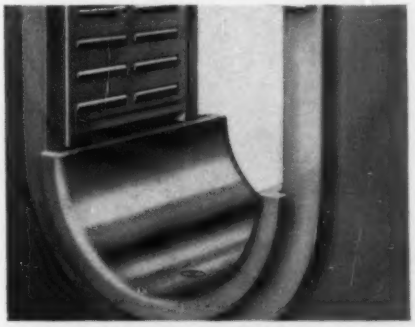
Recently, Farrel has pioneered a number of major refinements in sugar-cane grinding equipment. These have led to increased sucrose extraction, lower operating costs, simplified maintenance, and improved reliability.

Described here are but a few of the many design features which make Farrel mills the most efficient you can buy. Send for bulletin 312, which tells the story in detail.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT, U.S.A.
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

FARREL®

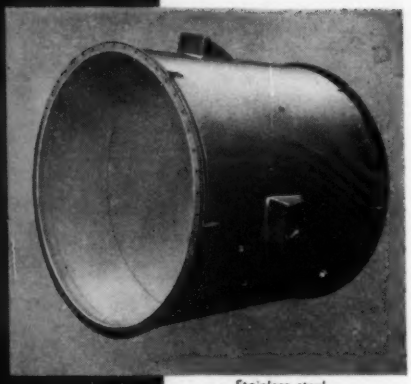
Long, rigid, hydraulic piston maintains uniform pressure on top roll for maximum juice extraction. Piston can be easily removed to replace simple one-piece packing.



Exclusive ladder-type roller bearing between top-roll brass and housing on cane side eliminates friction normally resulting from oblique roll loading.

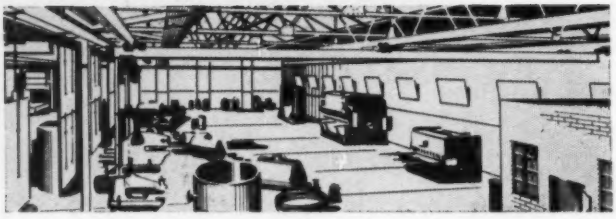
FB-1187

1,000 gall. kettle in ¼" copper. Lynx Quasi-arc welded.



Stainless steel vessel with mild steel jacket

12,000 gallon water separator



WELDED FABRICATIONS

ORDINARY OR EXTRAORDINARY

CLARKS CAN COPE

STAINLESS STEEL, MILD STEEL, ALUMINIUM FABRICATIONS COMPLETE WITH VALVEWORK AND PIPEWORK

METALLIC ARC WELDING

ARGONAUT AND ARGON-ARC WELDING

STRESS-RELIEVING AND TESTING FACILITIES

Clark's modern methods, efficient equipment, unique facilities and practical approach all operate to your advantage....

Clarks offer you a unique combination of the most advanced equipment and methods with a century-old reputation for high craftsman standards on every type of fabrication work.

Stainless steel, mild steel, aluminium, copper or aluminium-bronze . . . Clarks of Hull will not only give you the practical solution to your problem—they'll deliver a first-class job on time !

Send that enquiry *first* to Clarks of Hull.

CLARK

GEORGE CLARK & SONS (HULL) LIMITED
HAWTHORN AVENUE, HULL

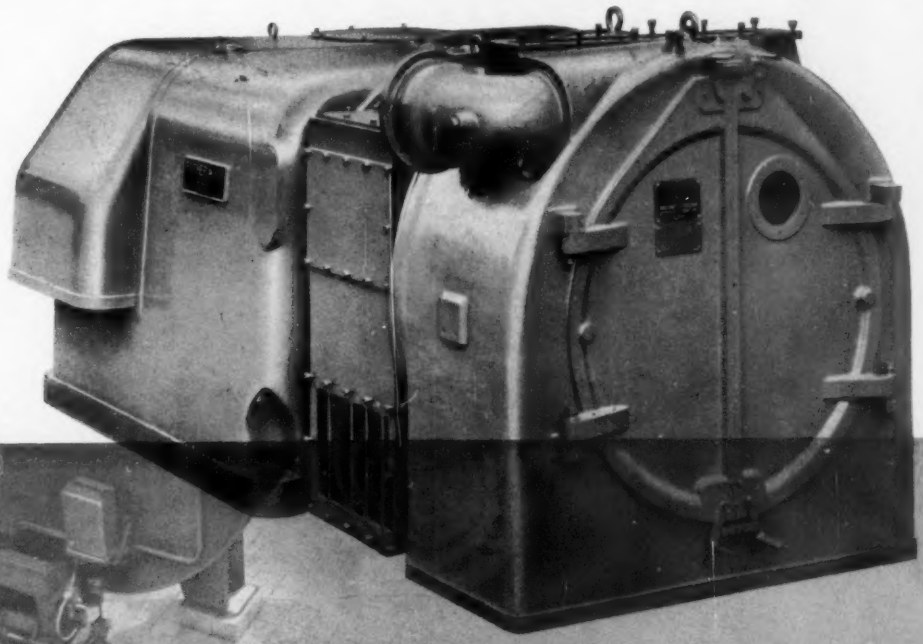
Telephone 37654 Telegrams 'Clark Hull'

A MEMBER OF THE NEWMAN HENDER GROUP

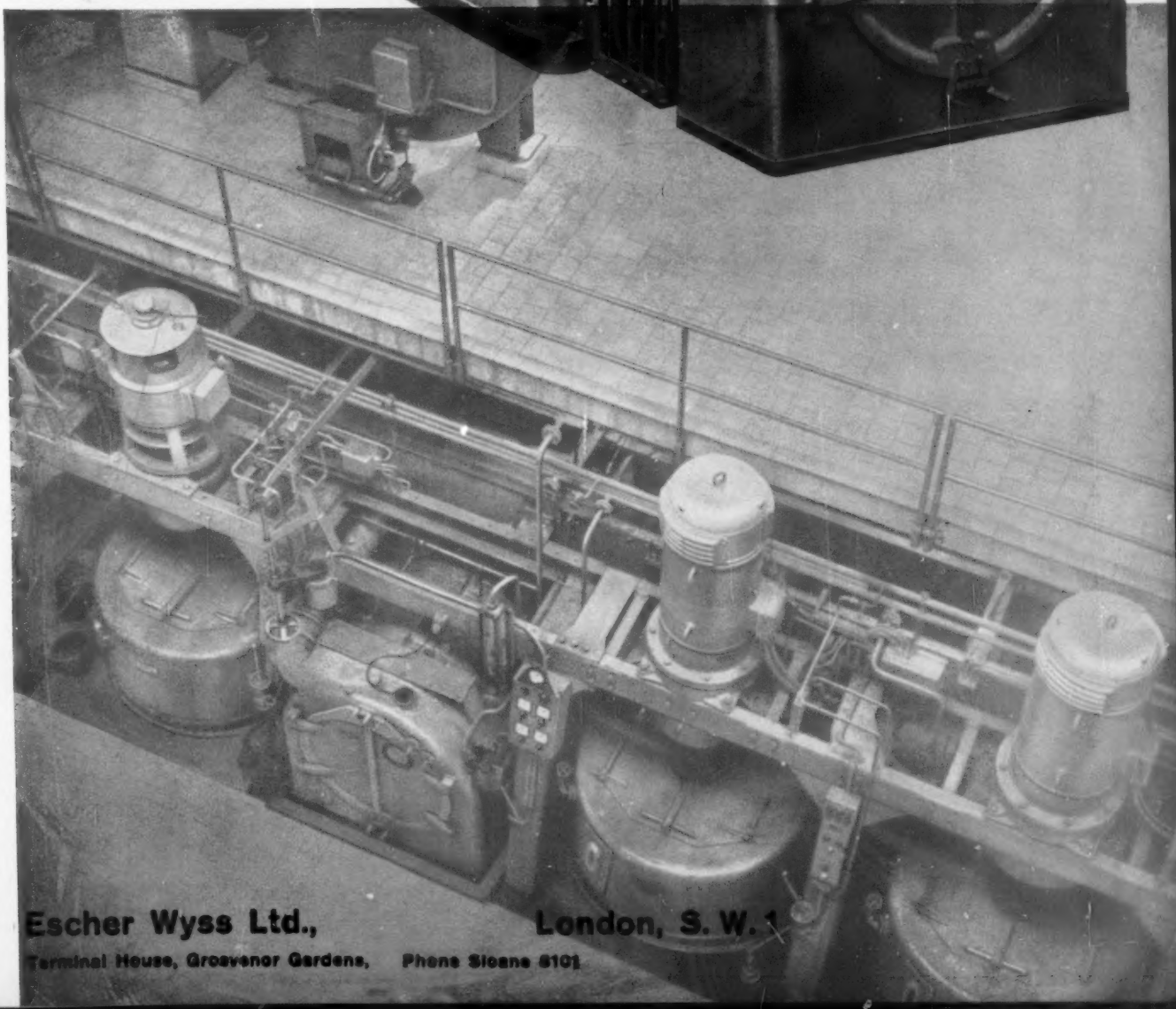
ESCHER WYSS

continuous centrifuges for the sugar industry

These centrifuges are in operation at Sugar Factories throughout the world.



Escher Wyss Centrifuge as replacement in a battery of vertical machines.



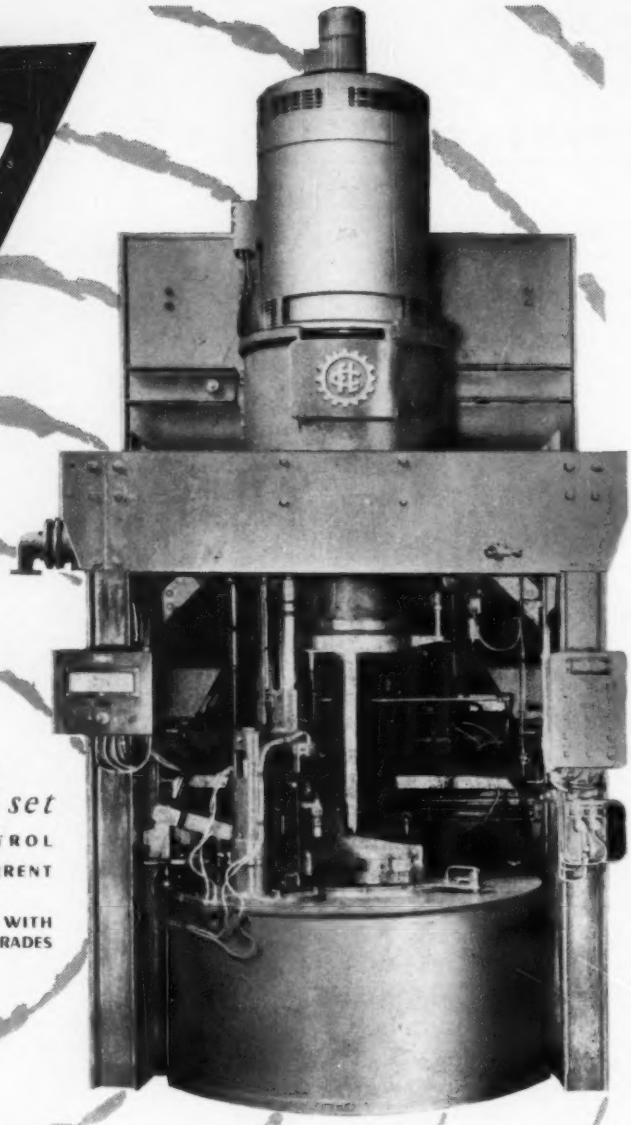
Escher Wyss Ltd., **London, S. W. 1**

Terminal House, Grosvenor Gardens, Phone Sloane 6101

Fully automatic!

the new

CENTRIFUGAL



driven by
WARD-LEONARD *set*

- ELECTRONIC CONTROL
- ELIMINATION OF CURRENT PEAKS
- RECORD PRODUCTION WITH MASSECUITES OF ALL GRADES

Battery of 4 centrifugals at the Fontaine-le-Dun Sugar Factory (France)

S.A.G. - PARIS

FIVES LILLE - CAIL

7, rue Montalivet, PARIS (8e) - Tél.: ANJou 22-01 et 32-40

GRUENDLER CANE SHREDDING PROCESS IS NOW A PROVEN AND ACCEPTED PRACTICE THROUGHOUT THE WORLD

SPANNING THE SUGAR WORLD WITH AN ASSURANCE OF

- INCREASED SUCROSE EXTRACTION
- INCREASED CAPACITY
- LONGER ROLL LIFE
- BETTER BAGASSE

GRUENDLER CRUSHER & PULVERIZER CO.

Established 1885

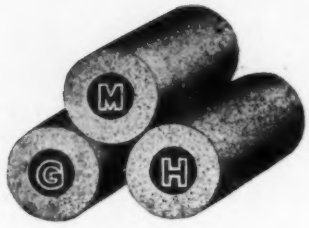
2915 North Market
St. Louis 6, Mo., U.S.A.

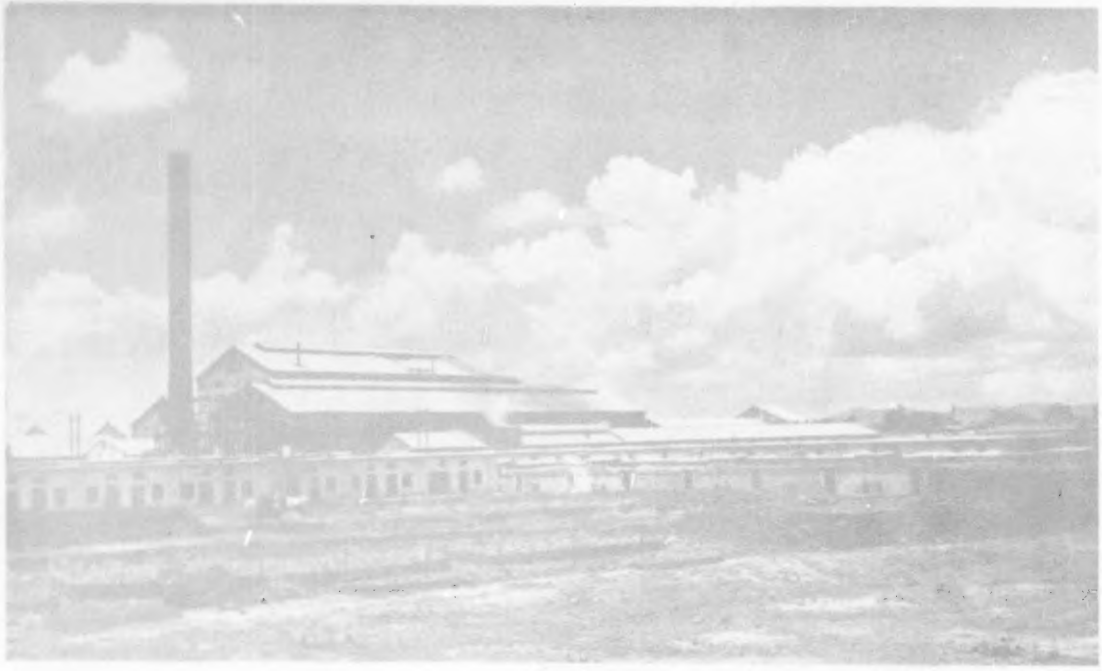
Leo Freeman, V. P. Sugar Mill Div.
2530 Terrace Ave., Baton Rouge, La., U.S.A.

Manufacturer of
Shock Grain Pulverizers
Cane Trash Shredders
Bagasse Cleaner
and Filter Aid
Bale Breakers
Elevating and
Conveying Equipment

WHEN ORDERING SPECIFY TO YOUR ENGINEER

HAY





Sugar-Mill Rollers

FOR MAXIMUM GRIP
& MINIMUM WEAR

G. M. HAY & CO. LTD.
Ironfounders, GLASGOW

More than 500

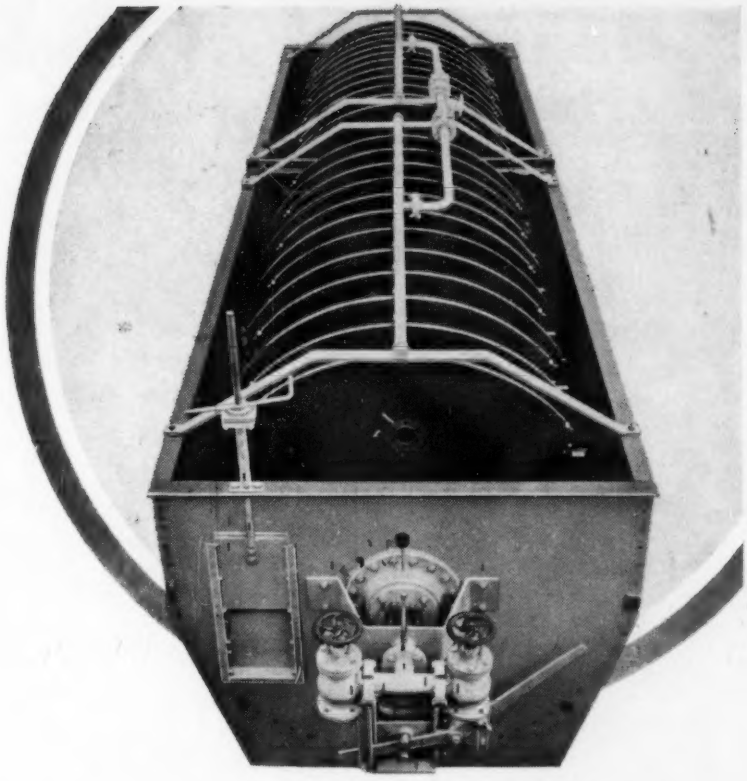
WERKSPOOR

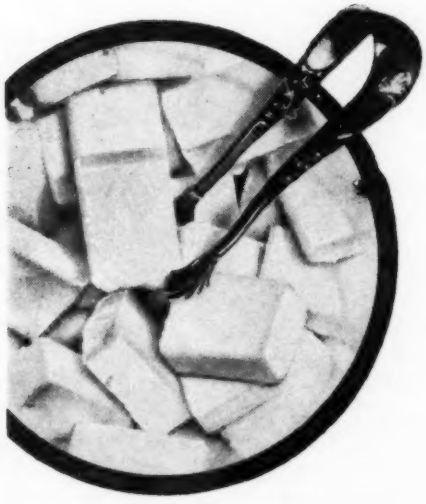
Rapid

Crystallizers

in use in

sugar factories





Applications for high grade as well as for LOW GRADE massecuites!

Licensees for the manufacturing of Werkspoor Rapid Crystallizers:

Ansaldo - San Giorgio
Genoa - Italy

Atlantic, Gulf and Pacific Company of Manila, Inc.
Manila - Philippines

Maschinenfabrik Buckau R. Wolf A.G.
Grevenbroich - Germany

Fives Lille - Cail S.A.
Paris - France

Honolulu Iron Works Co. Inc.
Honolulu - Hawaiian Islands

Honolulu Iron Works Co. Inc.
New York - U.S.A.

A. & W. Smith & Co. Ltd.
London - Great Britain

Succesores de Abarca Inc.
San Juan - Puerto Rico

WERKSPOOR

AMSTERDAM WORKS (Holland)

THE WORLD IS OU

The Edwards System is the best and most modern sugar mill hydraulic system that can be purchased. The Edwards System has many advantages over all other kinds of mill hydraulics, viz.: Separate pressure on each ram improves mill work—No Inertia—No Friction—No Moving Parts to wear out—Long Life with No Maintenance—Quick and Cheap to Erect—Saves Floor Space—Low Shipping Weight—Overall Cost much less than other Types.

INSTALLATIONS DOMESTIC AND FOREIGN:

Louisiana, U.S.A.

Angola
Armant
Audubon
Billeaud
Caldwell
Catherine-Supple
Catherine-Carruth
Cinclare
Columbia
Cora Texas
Cypremort
Delgado Albania
Duhe & Bourgeois
Enterprise
Erath
Evan Hall
Evangeline
Glenwood
Greenwood
Leighton
Meeker
Poplar Grove
St. James
St. John
St. Mary
San Francisco
Slack
Southdown
Supreme
Sterling
Valentine
Vermillion
Vida

Florida, U.S.A.

Fellsmere
Okeelanta

Hawaii, U.S.A.

Hawaiian Agricultural
H. C. & S.
Hakalau
Hamakua
Honokaa
Hutchinson
Kahuku
Kekaha
Kilauea
Kohala
Laupahoehoe
Lihue
McBryde
Ojaa
Olokele
Onomea
Pasuhau

Puerto Rico

Aguirre
Cambalache
Los Caños
Canóvanas
Cayey
Coloso
Cortada
Eureka
Fajardo
Guamani
Guánica
Igualdad
Juanita
Juncos
Lafayette
Machete
Mercedita
Plata
Plazuela
Rio Llano
Roig
Rufina
San Vicente
Santa Juana

Virgin Islands

Bethlehem

Haiti

Usine Hasco

Cuba

Alava
Andrefta
Araujo
Bahia Honda
Baragua
Constancia
Corazón de Jesús
Cuba
Dolores
Dos Rosas
Florida
Francisco
Jatibonico
La Vega
Mabay
Macareño
Nazabal
Niágara
Palma
Patria
El Pilar
Porfuerza
Puerto
Resulta
Salvador
San Antonio
San Cristobal
San Germán
San Isidro
Santa Maria
Sofia
Soledad
Tinguaro
Tuinucú
Ulacia

Jamaica, B.W.I.

Appleton Estate
Bernard Lodge
Bybrook
Caymanas
Frome
Hampden Estates
Innswood
Long Pond
Monymusk
New Yarmouth
Richmond Llandovery
Rose Hall
Sevens, Ltd.
Vale Royal
Worthy Park

Antigua, B.W.I.

Antigua

British Guiana

Diamond
Enmore
La Bonne Intention
Leonora
Rose Hall
Uitvlugt
Wales Estate

Trinidad, B.W.I.

Brechin Castle
Esperanza
Forres Park
Orange Grove
St. Madeleine
Woodford Lodge

Barbados, B.W.I.

Applewhaites
Bulkeley
Carrington
Fairfield
Lower Estate
Searles
Uplands
Vaucluse

St. Lucia, B.W.I.

Roseau

Guadeloupe, F.W.I.

Beauport
Bonne Mère
Grosse Montagne
Marquisat

Martinique, F.W.I.

Petit Bourg
Usine du Francois
Lareinty
Usine du Marin
St. Marie

Mexico

Agua Buena
Atencingo
Calipam
El Carmen
Casasano
Catmis
La Concepción
Constancia
Cuatotolapam
El Dorado
Dos Patrias
Independencia
La Joya
Mahuixtlán
El Mante
Los Mochis
El Modelo
Oacalco
Potrero
La Primavera
Central Progreso
El Progreso
La Providencia
Puruarán
Quesería
San Cristobal
San Francisco Ameca
San Francisco Naranjal
San José de Abajo
San Marcos
San Nicolás
San Pedro
Santa Clara
Tamazula
Taretán
Finca Venecia
Xicotencatl
Zapata

Nicaragua

Amalia
Dolores
Montelimar
Monte Rosa
San Antonio

Guatemala

El Baúl
Concepción
E. Escamilla
Magdalena
Mirandilla
Olga W. de Girón
Palo Gordo
Pantaléon
El Salto
Sonrisa
Los Tarros
Tululá

El Salvador

El Angel
La Cabaña
El Castaño
Chanmico
Colima
La Fincona
La Laguna
La Magdalena
San Isidro
El Sunza
Talcualhuya

Honduras

Cia. Azucarera Hondureña

Costa Rica

La Argentina
Birris
Cataluña
Costa Rica
Florencia
La Hilda
Las Mercedes
Gastón Peralta
El Porvenir
Eduardo Pinto
Rio Segundo
Rosales
Tura Hnos.
Victoria, Coop.
Hacienda Juan Viñas

Dom. Republic

Barahona
Boca Chica
Caei
Catarey
Consuelo
Cristobal Colón
Esperanza
Monte Llano
Ozama
Porvenir
Quisqueya
Rio Haina-Boya
Romana

British Honduras

Corozal Sugar Factory

Venezuela

Mérida
El Palmar
Rio Turbio
Santa Teresa
A. Sosa Izquierdo
Tacarigua
Tocuyo

Colombia

Castilla
La Industria
Manuelita
Mayaguez
Melendez
Oriente
Palestina
San Carlos
San Fernando
San José
Tumaco

Bolivia

La Bélgica
La Esperanza

Ecuador

San Carlos
Valdéz

Argentina

Undisclosed (Fulton)
Ledesma S.A.

Peru

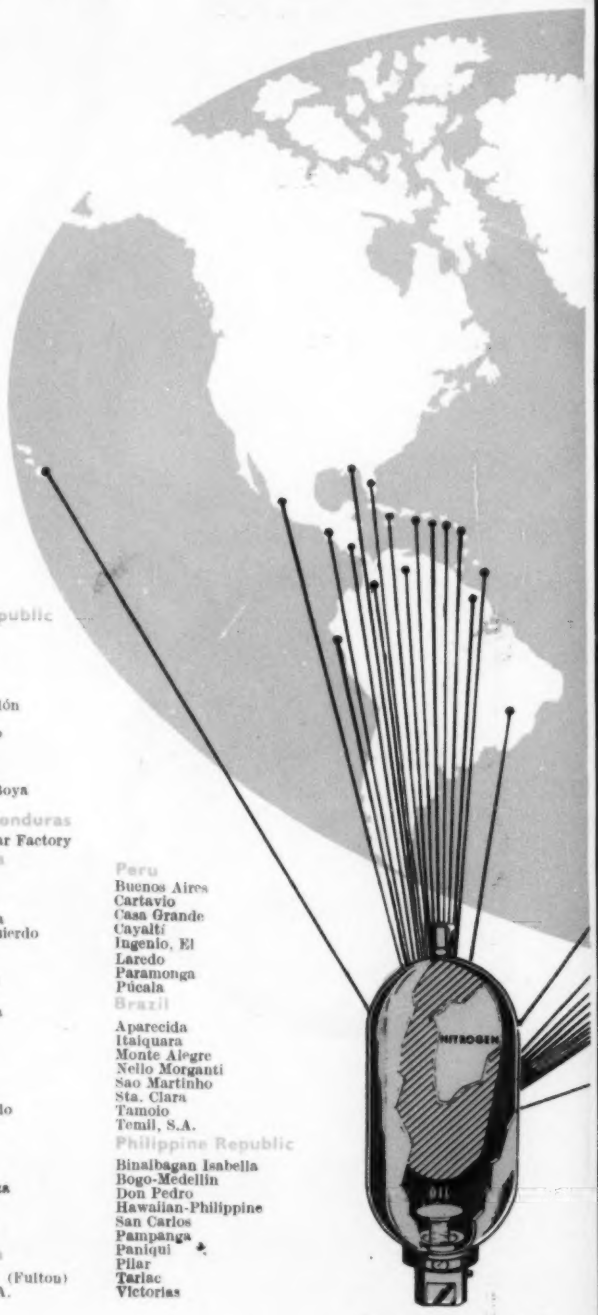
Buenos Aires
Cartavio
Casa Grande
Cayaltí
Ingenio, El
Laredo
Paramonga
Pucala

Brazil

Aparecida
Itaiquara
Monte Alegre
Nello Morganti
Sao Martinho
Sta. Clara
Tamoio
Temil, S.A.

Philippine Republic

Binalbagan Isabella
Bogo-Medellin
Don Pedro
Hawaiian-Philippine
San Carlos
Pampanga
Paniqui
Pilar
Tarlac
Victorias



Hydro-Pneumatic Bladder Type Accumulator Weight 186 lbs. (9 × 56 inches).

R MARKET!

★
Edwards Accumulators now installed in over 435 factories

THE EDWARDS HYDRAULIC SYSTEM WIDELY ACCLAIMED

Pakistan
Charsadda
East Pakistan
Lyallpur
Rangpur
Tando Mohammed Khan
Thakurgaon

Burma
Pyinmana

Taiwan
Nantsing

Australia
Bingera
Fairymead
Farleigh
Gifu
Kalamia
Marian
Millaquin
Mourilyan
Pleystowe

British East Africa
Arusha Chini
Tanganyika
Uganda

Union of South Africa
Doornkop
Felixton
Gledhow
Glendale
Illovo
Melville
Renishaw
Swaziland
Tongaat
Umfolozi
Umzimkulu
Zululand

Portuguese East Africa
Chirundu
Luabo Estate
Mhlume
Torreao

Mauritius
Belle Vue Harel
Belle Vue Mauricia
Benares
Deep River
Flacq, Union
Highlands
Medine
Mon Tresor & Mon Desert
The Mount
Reunion
Riche-en-Eau
Saint Antoine

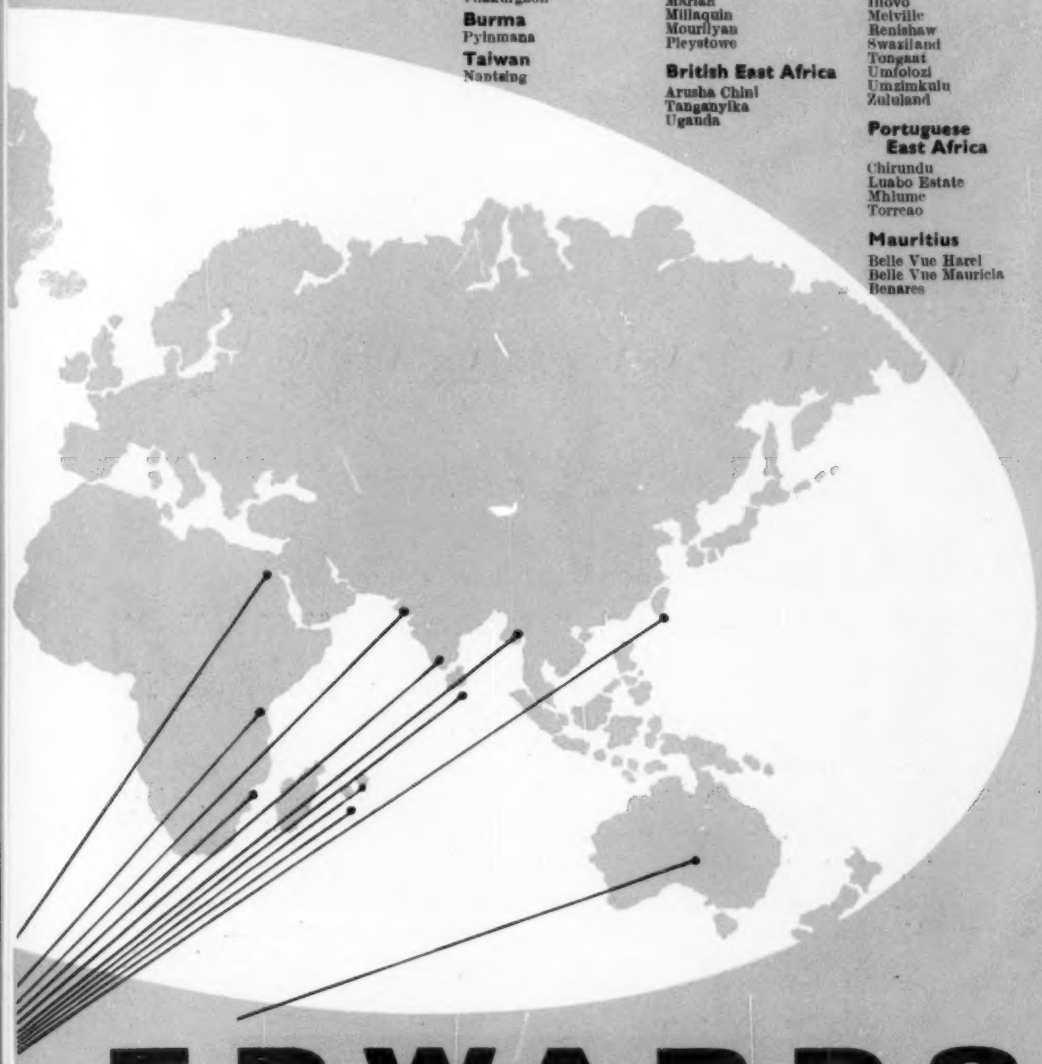
Reunion
Grand Bois

India
Adjudhia
Amadavalsa
Amaravati
Andhra
Assam
Baghpat
Bazpur
Bellary
Bharat
Bhogawati
Bist Ind.
Cauvery
Challapalli
Chitale
Daurala
Ganga
Gangapur
Girna
Gobind
Godavari
Harinagar
Haryana
Hindusthan
India Sugars
Janta
K.C.P.
Kahanta
Karegaon
Kirlampudi
Kodinar
Kolhapur
Lakshmiwadi
Madurantakam
Mahalakshmi
Malegaon
Mawana
Modi
National
Nellikuppam
Neoli
New Horizon
New India
New Swadeshi
Nizam
North Arcot
Oudh
Pandavapura
Panipat
Pravarangar
Rahuri
Rai Bahadur
Ramkola
Ramnugger
Ravalgaon
Sahakari
Samalkot
Shetkari
Shree Changdeo
Shree Khedut
Shree Krishna
Shree Panchaganga
Shri Warana
Simbhaoli
South Behar
Sri Rama Shakari
Sri Sarvaraya
Sri Shadooran
Thiru Ari Lal
Tungbhadra
Ugar
Upper Doab
Upper Ganges
Upper India
V.V.S. (Jeypore)
Walchandnagar
Warana

Ceylon
Gal Oya
Kantalai

Egypt
Edfu
Ermant

Thailand
Thai Sugar



EDWARDS
ENGINEERING CORPORATION

715 CAMP STREET • NEW ORLEANS 12, LA • U S A

REPRESENTATIVES AND AGENTS: Scott, Farnell & Partners—**LONDON.** Agencia Macfarlane, S.A.—**CUBA.** Porto Rico Iron Works, Inc.—**PUERTO RICO.** Abarca Warehouses Corp. and Porto Rico Iron Works, Inc.—**DOMINICAN REPUBLIC.** Robinson & Co., Ltd.—**JAMAICA.** H. E. Robinson & Co., Ltd.—**TRINIDAD.** Guy de Jaham—**MARTINIQUE.** Law & Connell and D. M. Simpson Co.—**BARBADOS.** Ets. Souquet-Basiege—**GUADELOUPE.** Sandbach, Parker & Co., Ltd.—**BRITISH GUIANA.** Cia. Importadora de Maquinaria—**EL SALVADOR.** Kepaco, S.A.—**GUATEMALA.** Jorge Halder—**COSTA RICA.** Ingenieros Azucareros, S.A.—**MEXICO.** Cia. Importadora de Maquinas "Comac", Mario Dedini, Marne, Ltd., Jayme Machado—**BRAZIL.** H. & O. Romer, Sucr.—**VENEZUELA.** Eduardo A. Tate, Ing.—**ARGENTINA.** Peruvian Trading Corp., Ltd., S.A.—**PERU.** General Sales Corp. Ltda., Abarca Warehouses Corp. and Representaciones Asociadas, Ltda.—**COLOMBIA.** Honolulu Iron Works Co.—**HAWAII, U.S.A. & PHILIPPINE REPUBLIC.** Edward L. Bateman (Pty.) Ltd.—**UNION OF SOUTH AFRICA.** Dorr-Oliver (India), Ltd.—**INDIA & PAKISTAN.** Bundaberg Foundry Coy., Ltd.—**AUSTRALIA.** Ireland Fraser & Co., Ltd.—**MAURITIUS.** The Tanarak Co. Ltd.—**THAILAND.** Wm. Hunt & Co. (Int'l), Inc.—**FORMOSA.**

U.S. PATENT 2,691,339; British Patent 679,053; French Patent 1,020,656; Cuban Patent 15,073; Mexican Patent 52,402; Patents Pending Other Countries.

THE WORLD IS OU

The Edwards System is the best and most modern sugar mill hydraulic system that can be purchased. The Edwards System has many advantages over all other kinds of mill hydraulics, viz.: Separate pressure on each ram improves mill work—No Inertia—No Friction—No Moving Parts to wear out—Long Life with No Maintenance—Quick and Cheap to Erect—Saves Floor Space—Low Shipping Weight—Overall Cost much less than other Types.

INSTALLATIONS DOMESTIC AND FOREIGN:

Louisiana, U.S.A.

Angola
Armant
Audubon
Billeaud
Caldwell
Catherine-Supple
Catherine-Carruth
Cinclare
Columbia
Cora Texas
Cypremort
Delgado Albania
Duhe & Bourgeois
Enterprise
Erath
Evan Hall
Evangeline
Glenwood
Greenwood
Leighton
Meeker
Poplar Grove
St. James
St. John
St. Mary
San Francisco
Slack
Southdown
Supreme
Sterling
Valentine
Vermillion
Vida

Florida, U.S.A.

Fellsmere
Okeelanta

Hawaii, U.S.A.

Hawaiian Agricultural
H. C. & S.
Hakalau
Hamakua
Honokaa
Hutchinson
Kahuku
Kekaha
Kilauea
Kohala
Laupahoehoe
Lihue
McBryde
Olaa
Olokele
Onomea
Paauhau

Puerto Rico

Aguirre
Cambalache
Los Caños
Canóvanas
Cayey
Coloso
Cortada
Eureka
Fajardo
Guamaní
Guánica
Igualdad
Juanita
Juncos
Lafayette
Machete
Mercedita
Plata
Plazuela
Rio Llano
Roig
Rufina
San Vicente
Santa Juana

Virgin Islands

Bethlehem

Haiti

Usine Hasco

Cuba

Alava
Andrefia
Araujo
Bahia Honda
Baragua
Constancia
Corazón de Jesús
Cuba
Dolores
Dos Rosas
Florida
Francisco
Jatibonico
La Vega
Mabay
Macareño
Nazabal
Niágara
Palma
Patria
El Pilar
Porfuerza
Puerto
Resulta
Salvador
San Antonio
San Cristobal
San Germán
San Isidro
Santa Maria
Sofia
Soledad
Tinguaro
Tuinucú
Ulacia

Jamaica, B.W.I.

Appleton Estate
Bernard Lodge
Bybrook
Caymanas
Frome
Hampden Estates
Innswood
Long Pond
Monymusk
New Yarmouth
Richmond Llandovery
Rose Hall
Sevens, Ltd.
Vale Royal
Worthy Park

Antigua, B.W.I.

Antigua

British Guiana

Diamond
Enmore
La Bonne Intention
Leonora
Rose Hall
Uitvlugt
Wales Estate

Trinidad, B.W.I.

Brechin Castle
Esperanza
Forres Park
Orange Grove
St. Madeleine
Woodford Lodge

Barbados, B.W.I.

Applewhaites
Bulkeley
Carrington
Fairfield
Lower Estate
Searles
Uplands
Vaucluse

St. Lucia, B.W.I.

Roseau

Guadeloupe, F.W.I.

Beauport
Bonne Mere
Grosse Montagne
Marquisat

Martinique, F.W.I.

Petit Bourg
Usine du Francois
Lareinty
Usine du Marin
St. Marie

Mexico

Agua Buena
Atencingo
Calipam
El Carmen
Casasano
Catmis
La Concepción
Constancia
Cuatotolapam
El Dorado
Dos Patrias
Independencia
La Joya
Mahuixtlán
El Mante
Los Mochis
El Modelo
Oacalco
Potrero
La Primavera
Central Progreso
El Progreso
La Providencia
Puruarán
Queseria
San Cristobal
San Francisco Ameca
San Francisco Naranjal
San José de Abajo
San Marcos
San Nicolás
San Pedro
Santa Clara
Tamazula
Taretán
Finca Venecia
Xicotencatl
Zapata

Nicaragua

Amalia
Dolores
Montelimar
Monte Rosa
San Antonio

Guatemala

El Baúl
Concepción
E. Escamilla
Magdalena
Mirandilla
Olga W. de Girón
Palo Gordo
Pantaléon
El Salto
Sonrisa
Los Tarros
Tuluiá

El Salvador

El Angel
La Cabaña
El Castaño
Chanmico
Colima
La Fincona
La Laguna
La Magdalena
San Isidro
El Sunza
Talcualhuya

Honduras

Cia. Azucarera Hondureña

Costa Rica

La Argentina
Birris
Cataluña
Costa Rica
Florencia
La Hilda
Las Mercedes
Gastón Peralta
El Porvenir
Eduardo Pinto
Rio Segundo
Rosales
Tura Hnos.
Victoria, Coop.
Hacienda Juan Viñas

Dom. Republic

Barahona
Boca Chica
Caei
Catarey
Consuelo
Cristobal Colón
Esperanza
Monte Llano
Ozama
Porvenir
Quisqueya
Rio Haina-Boya
Romana

British Honduras

Corozal Sugar Factory

Venezuela

Mérida
El Palmar
Rio Turbio
Santa Teresa
A. Soso Izquierdo
Tacarigua
Tocuyo

Colombia

Castilla
La Industria
Manuelita
Mayaguez
Melendez
Oriente
Palestina
San Carlos
San Fernando
San José
Tumaco

Bolivia

La Bélgica
La Esperanza

Ecuador

San Carlos
Valdéz

Argentina

Undisclosed (Fulton)
Ledesma S.A.

Peru

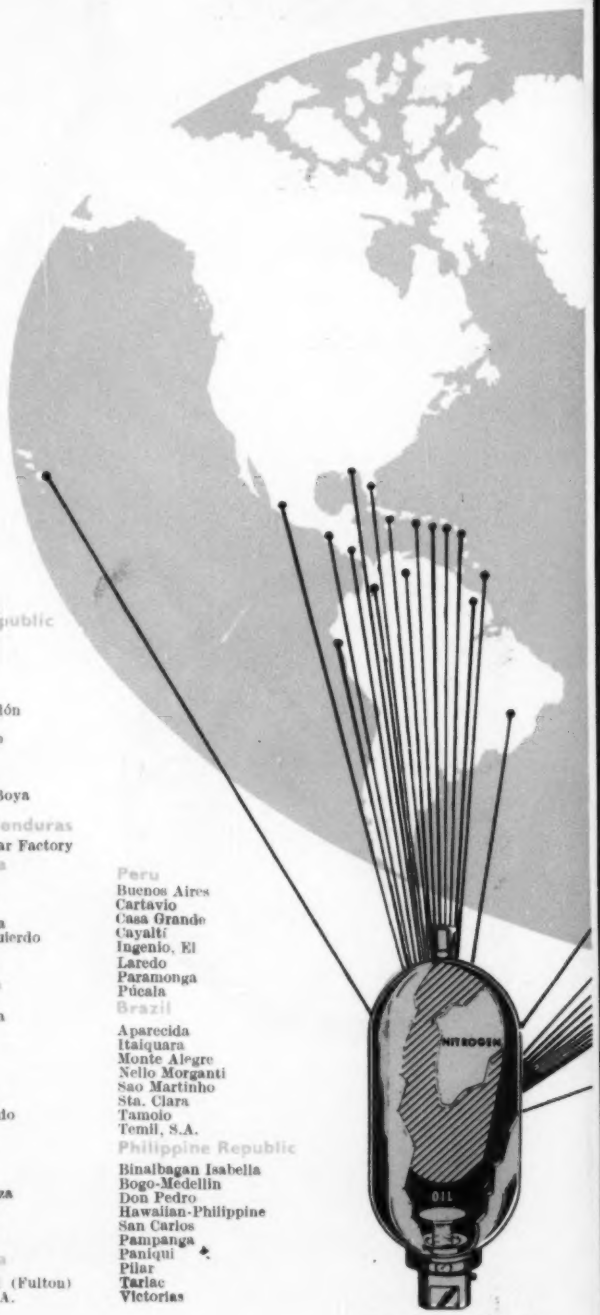
Buenos Aires
Cartavio
Casa Grande
Cayaltí
Ingenio, El
Laredo
Paramonga
Pucala

Brazil

Aparecida
Itaiquara
Monte Alegre
Nello Morganti
Sao Martinho
Sta. Clara
Tamoio
Temil, S.A.

Philippine Republic

Binalbagan Isabella
Bogo-Medellin
Don Pedro
Hawaiian-Philippine
San Carlos
Pampanga
Paniqui
Pilar
Tarlac
Victorias

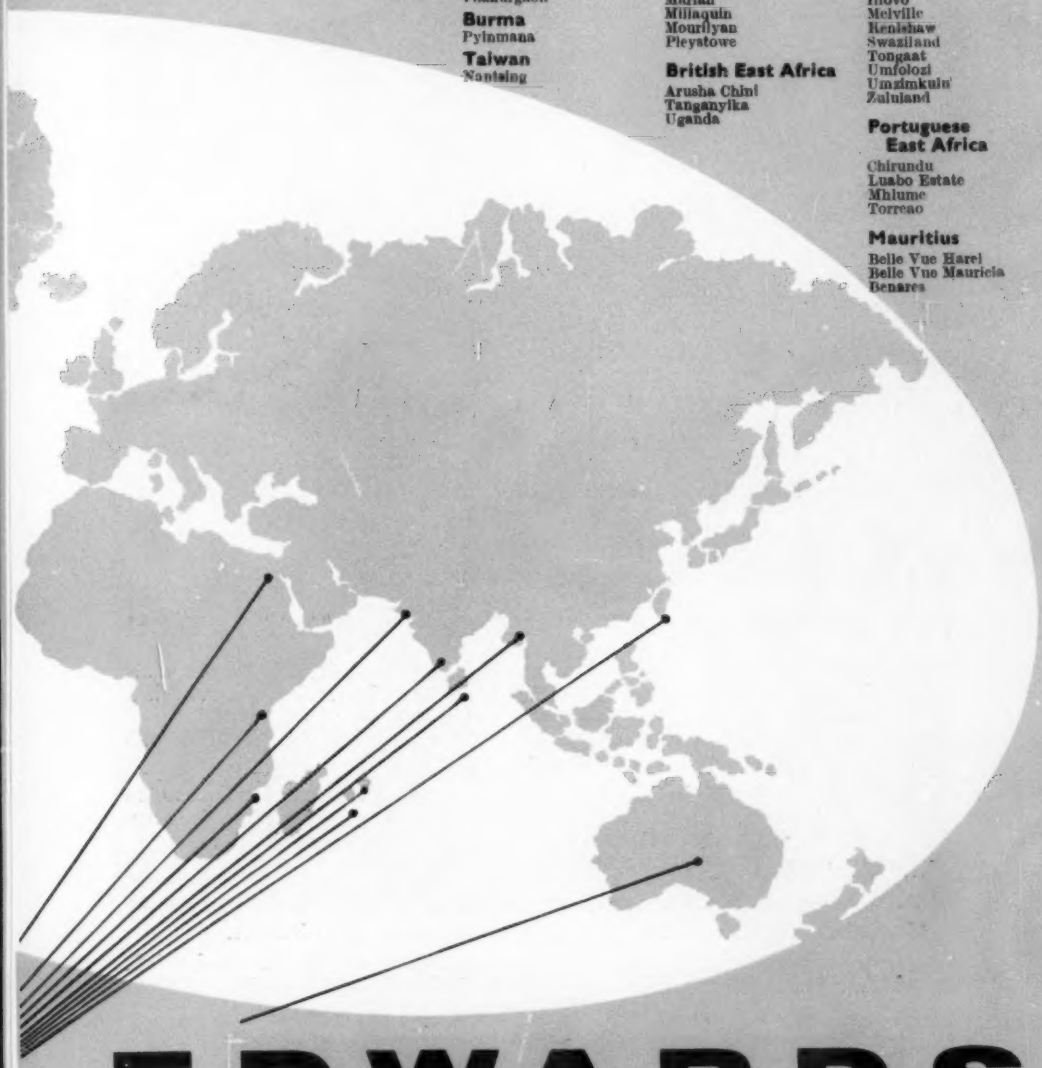


Hydro-Pneumatic Bladder Type Accumulator Weight 195 lbs. (9 × 56 inches).

R MARKET!

★
Edwards Accumulators now installed in over 435 factories

THE EDWARDS HYDRAULIC SYSTEM ***WIDELY ACCLAIMED***



Pakistan
Charsadda
East Pakistan
Lyallpur
Rangpur
Tando Mohammed Khan
Thakurgaon

Burma
Pyinmana

Taiwan
Nantsing

Australia
Bingera
Fairymead
Farleigh
Giru
Kalamia
Marian
Millaquin
Mourilyan
Pleystowe

British East Africa
Arusha Chini
Tanganyika
Uganda

Union of South Africa
Doornkop
Felixton
Gledhow
Glendale
Illovo
Melville
Renishaw
Swaziland
Tongaat
Umfolozi
Umzimkulu
Zululand

Portuguese East Africa
Chirundu
Luabo Estate
Mhlume
Torreao

Mauritius
Belle Vue Harel
Belle Vue Mauricia
Benares
Deep River
Flacq, Union
Highlands
Medine
Mon Tresor & Mon Desert
The Mount
Reunion
Riche-en-Eau
Saint Antoine

Reunion
Grand Bois

India
Adjudhia
Amadavalsa
Amaravati
Andhra
Assam
Baghpat
Bazpur
Bellary
Bharat
Bhogawati
Bist Ind.
Cauvery
Challapalli
Chitale
Daurala
Ganga
Gangapur
Girna
Gobind
Godavari
Harinagar
Haryana
Hindusthan
India Sugars
Janta
K.C.P.
Kahanta
Karegaon
Kiriampudi
Kodinar
Kolhapur
Lakshmiwadi
Madurantakam
Mahalakshimi
Malegaon
Mawana
Modi
National
Nellikuppam
Neoli
New Horizon
New India
New Swadeshi
Nizam
North Arcot
Oudh
Pandavapura
Panipat
Pravarangar
Rahuri
Rai Bahadur
Ramkola
Ramnugger
Ravalgaon
Sahakari
Samalkot
Shetkari
Shree Changdeo
Shree Khedut
Shree Krishna
Shree Panchaganga
Shri Warana
Simbhauli
South Behar
Sri Rama Shakari
Sri Sarvaraya
Sri Shadooran
Thiru Ari Lal
Tungbhadra
Ugar
Upper Doab
Upper Ganges
Upper India
V.V.S. (Jeypore)
Walchandnagar
Warana

Ceylon
Gal Oya
Kantalai

Egypt
Edfu
Ermant

Thailand
Thai Sugar

EDWARDS
ENGINEERING CORPORATION

715 CAMP STREET • NEW ORLEANS 12, LA • U S A

REPRESENTATIVES AND AGENTS: Scott, Farnell & Partners—**LONDON.** Agencia Macfarlane, S.A.—**CUBA.** Porto Rico Iron Works, Inc.—**PUERTO RICO.** Abarca Warehouses Corp. and Porto Rico Iron Works, Inc.—**DOMINICAN REPUBLIC.** Robinson & Co., Ltd.—**JAMAICA.** H. E. Robinson & Co., Ltd.—**TRINIDAD.** Guy de Jaham—**MARTINIQUE.** Law & Connell and D. M. Simpson Co.—**BARBADOS.** Ets. Souquet-Basiege—**GUADELOUPE.** Sandbach, Parker & Co., Ltd.—**BRITISH GUIANA.** Cia. Importadora de Maquinaria—**EL SALVADOR.** Kepaco, S.A.—**GUATEMALA.** Jorge Halder—**COSTA RICA.** Ingenieros Azucareros, S.A.—**MEXICO.** Cia. Importadora de Maquinas "Comac", Mario Dedini, Marne, Ltd., Jayme Machado—**BRAZIL.** H. & O. Romer, Sucr.—**VENEZUELA.** Eduardo A. Tate, Ing.—**ARGENTINA.** Peruvian Trading Corp., Ltd., S.A.—**PERU.** General Sales Corp. Ltda., Abarca Warehouses Corp. and Representaciones Asociadas, Ltda.—**COLOMBIA.** Honolulu Iron Works Co.—**HAWAII, U.S.A. & PHILIPPINE REPUBLIC.** Edward L. Bateman (Pty.) Ltd.—**UNION OF SOUTH AFRICA.** Dorr-Oliver (India), Ltd.—**INDIA & PAKISTAN.** Bundaberg Foundry Coy., Ltd.—**AUSTRALIA.** Ireland Fraser & Co., Ltd.—**MAURITIUS.** The Tanarak Co. Ltd.—**THAILAND.** Wm. Hunt & Co. (Int'l), Inc.—**FORMOSA.**

U.S. PATENT 2,691,339; British Patent 678,053; French Patent 1,020,656; Cuban Patent 15,078; Mexican Patent 52,402; Patents Pending Other Countries.

SUBSOILERS

THE SPEARHEAD OF SUCCESSFUL CULTIVATION

Increased soil fertility, conservation of moisture, bigger yields and better crops are among the many advantages to be derived by breaking up hard subsoil, and, in their present series of subsoilers, Ransomes offer three outstanding **trailed** models for all conditions, and all sizes of tractor. All are of high-grade steel, with simple, efficient self-lift and accurate adjustment for depth.

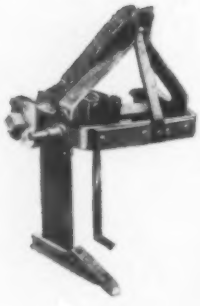
C.59. This will break the subsoil to depths up to 26 in. in most strenuous conditions. In place of the single standard, two for working 18 in. deep can be fitted, or three which will give good results up to 14 in. deep.

C.1. For hard, rough work up to a depth of 22 in.

C.8. For medium conditions and depths up to 18 in.

All can be converted to ridgers, trenchers, cultivators or mole drainers.

If a **mounted** implement is preferred, Ransomes offer the **C.75,** illustrated at left, which will give first-class results up to 22 in. deep without disc coulter.



Illustrated literature showing full range of implements for sugar cultivation will be sent on request.

Ransomes

FAMOUS THROUGHOUT THE WORLD FOR AGRICULTURAL MACHINERY

RANSOMES SIMS & JEFFERIES LTD., IPSWICH, ENGLAND

DISTRIBUTORS IN MOST COUNTRIES.

YORKSHIRE IMPERIAL

place at your disposal
their long, specialised experience
in the metallurgical development
and manufacture of

TUBES FOR THE SUGAR INDUSTRY

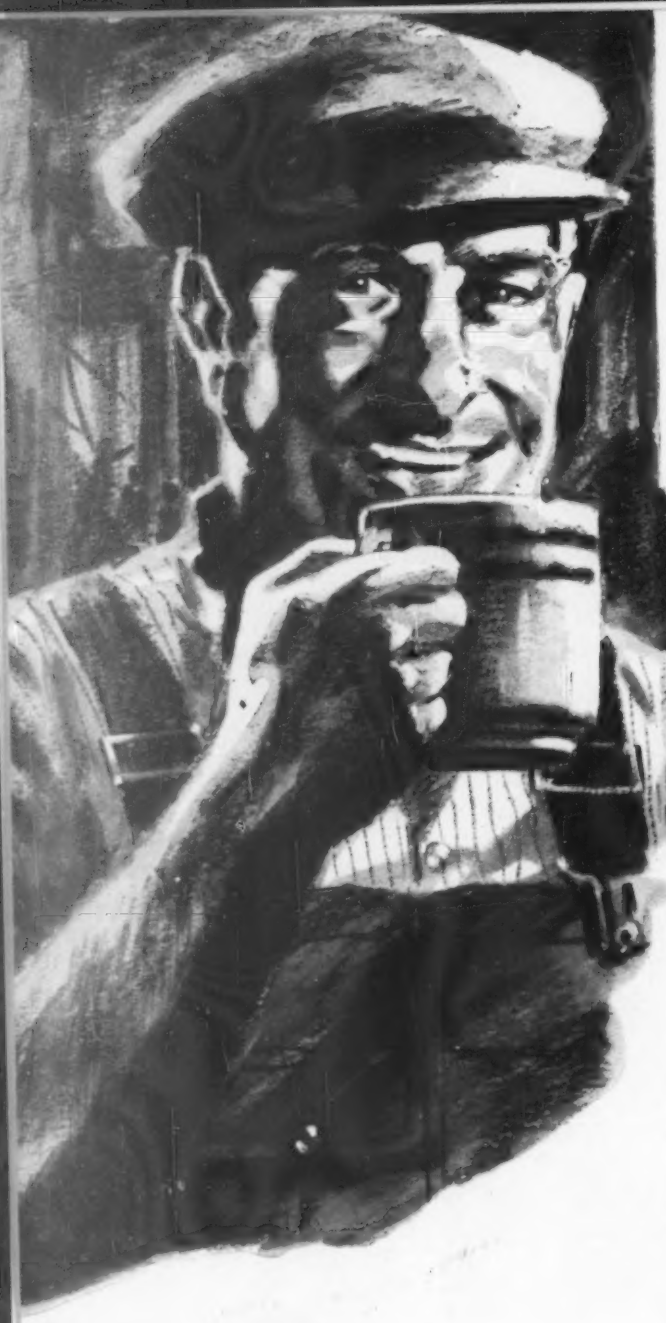
The resources of Yorkshire Imperial Metals Limited are devoted solely to the manufacture of non-ferrous tubes, plates and fittings, and plastic tubes and fittings. They have long been intimately associated with the Sugar Industry, both at home and overseas, and have made a careful study of the varied and often arduous operating conditions which obtain in the Industry. This study has resulted in the development of improved tube and plate alloys, metallurgically designed and scientifically manufactured to give the best possible service. This unrivalled experience is at your service, free of charge and without obligation, to assist in the solution of problems of all kinds affecting the life and use of non-ferrous tubes and plates.

Yorkshire Imperial craftsmanship, metallurgical skill and specialised experience, together with modern plant and methods and accurate control at every stage of manufacture, account for the enviable reputation which *Yorkshire Imperial* tubes and plates and *Yorkshire Imperial* fittings have achieved in their respective fields.

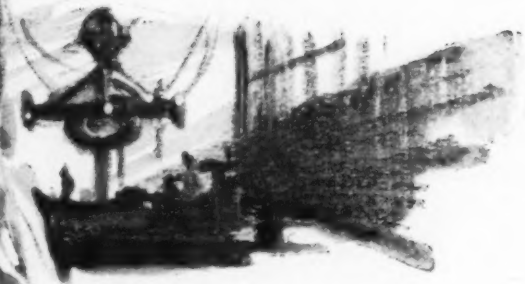
TUBES IN "YORCORON" · "KUNIFER 10" · COPPER AND "SEVA" BRASS · PLATES IN A WIDE RANGE OF ALLOYS · BI-METAL TUBES AND PLATES.

YORKSHIRE IMPERIAL METALS LIMITED

HEAD OFFICE—P.O. BOX 166, LEEDS.
TELEPHONE: LEEDS 7-2222



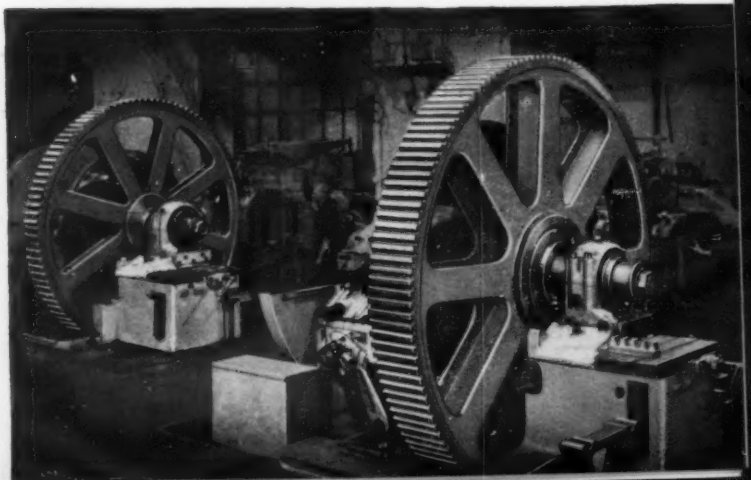
Helping to sweeten it is our cup of tea



Tea needs sugar. Sugar needs refining. Refineries need gears. Big gears, heavy gears, reliable gears. That's where the Jackson Division of David Brown comes in.

What, in particular, can David Brown offer? First, the advantages in speed and reliability of having casting, machining and cutting carried out in the same organisation. Second, the capacity to produce heavy-duty gears—spur, helical or bevel—up to any size and weight for any industry and every bit as accurately as you need. Third, the finest advice on heavy gear design problems that you will find anywhere.

Behind every 'Jackson' gear there are over 100 years of sound technical experience. In front of every 'Jackson' gear there is a long, long life of hard, hard work. And the bigger your requirements, the better David Brown can handle them.



DAVID BROWN

THE DAVID BROWN CORPORATION (SALES) LIMITED

JACKSON DIVISION · SALFORD WORKS

HAMPSON STREET · MANCHESTER 5

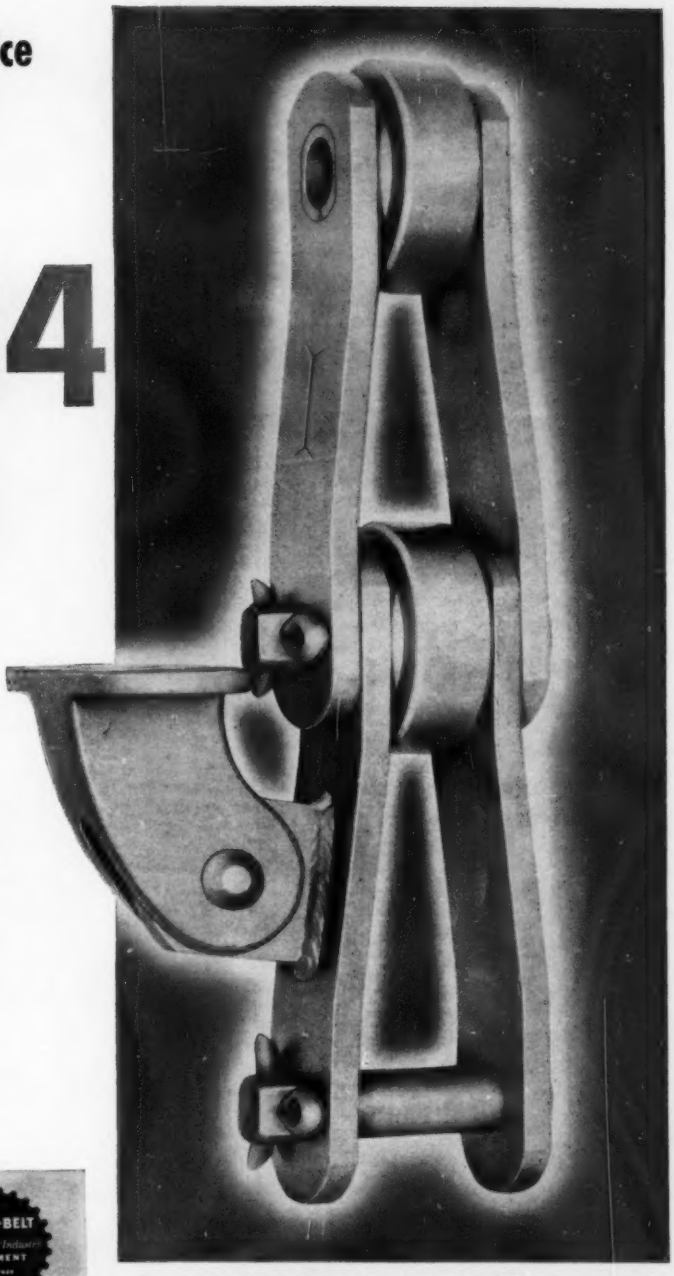
Telephone Blackfriars 3577 (4 lines)

For bagasse carrier service modern mills specify

LINK-BELT

SS-2184 PLUS

CHAIN



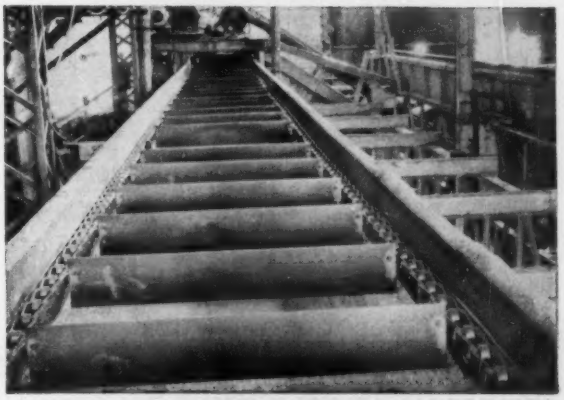
Exceptional strength and durability make Link-Belt SS-2184 Plus chain the choice for long, heavy-duty conveyors that reclaim and deliver bagasse to storage and boilers.

Use of selected steels plus controlled manufacture and assembly of parts result in increased life . . . reduced replacements and maintenance. When replacement becomes necessary, individual links with offset sidebars permit fast, easy removal.

What's more a wide range of SS class chains are available to permit the selection of the right chain to suit all bagasse carriers.

You can standardize on Link-Belt for all your drive and conveying needs. for example, Link-Belt Class 1100 malleable or Promal chains are ideal for shorter center bagasse carriers and ligher loads. For full facts, call your Link-Belt representative or write direct.

Send for Book 2640 containing 64-pages of information on Link-Belt's complete line of sugar-handling equipment.



LINK-BELT

CHAINS AND SPROCKETS

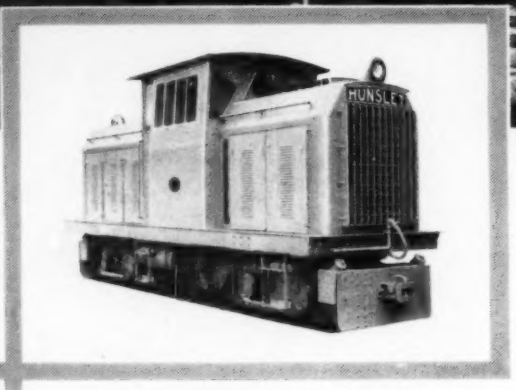
LINK-BELT COMPANY: Engineers · Manufacturers · Exporters of Machinery for Handling Materials and Transmitting Power · Established 1875.

EXPORT DIVISION: Dept. 460-18J, 233 Broadway, New York 7, U.S.A., Cable Address: Linkbelt—New York · Australia, Marrickville (Sydney) Brazil, Sao Paulo · Canada, Scarboro (Toronto) · South Africa, Springs.

Representatives Throughout the World 15.053-B

SERVING THE SUGAR INDUSTRY

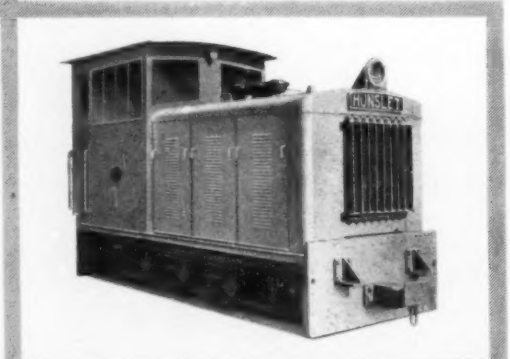
A fleet of Hunslet 204 h.p. 0-6-0 type diesel locomotives on heavy sugar cane haulage duties on a sugar estate in the West Indies.



230 *h.p. 'Articulated' diesel locomotive.*

HUNSLET

101 *h.p. 0-6-0 type diesel locomotive*

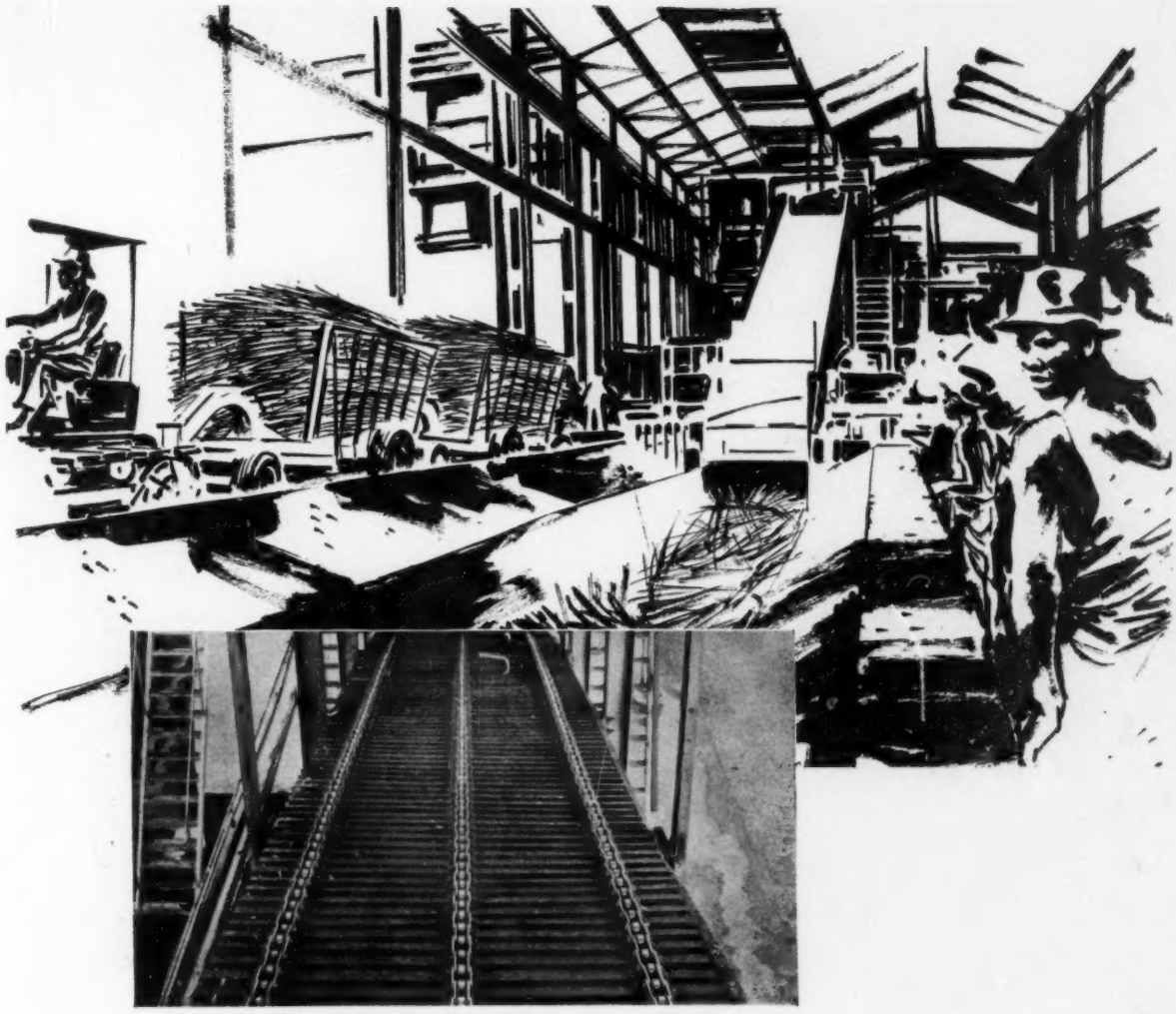


On estates and plantations all over the world Hunslet locomotives are in daily use, maintaining their reputation for absolute reliability and efficiency. This reputation is based on the skill and care which tends every stage of construction in the Hunslet works and in addition all Hunslet locomotives, wherever they may be serving, are backed by a comprehensive spares and service scheme.

THE HUNSLET ENGINE CO. LTD. LEEDS 10

London Office : Locomotive House, Buckingham Gate, Westminster, S.W.1.

H82.



6,655,000 tons of cane

carried in 32 years without need for repair — typical of the inherent toughness of

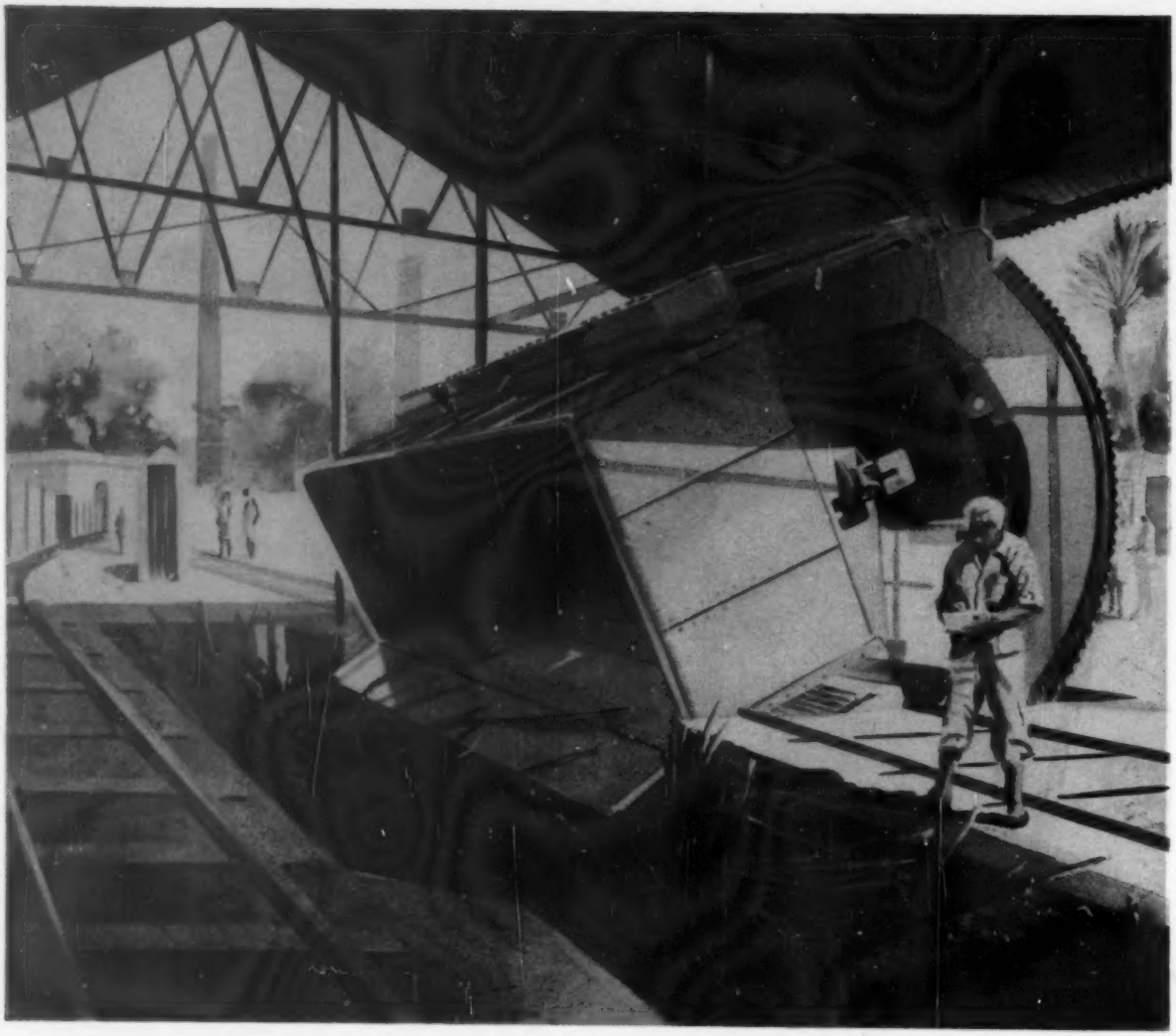
RENOLD

steel chains for conveying and elevating

Write for leaflet Ref. 120/26 giving full details of Renold conveyor chains — designed and manufactured for heavy and arduous duties in the cane sugar industry.

RENOLD

RENOLD CHAINS LIMITED · MANCHESTER



The S & H Cane Car Tippler In India

Unloading Cane

at Nellikuppam

The Strachan & Henshaw Tippler, installed at the East India Distilleries and Sugar Factories Limited will tip, and unload 4-wheeled and bogie cane cars up to 36 tons gross in two minutes.

The cars are clamped automatically, leaving the open tops unobstructed, and the cane is emptied into a trench at the side of the track for conveyance to the crushing mills.

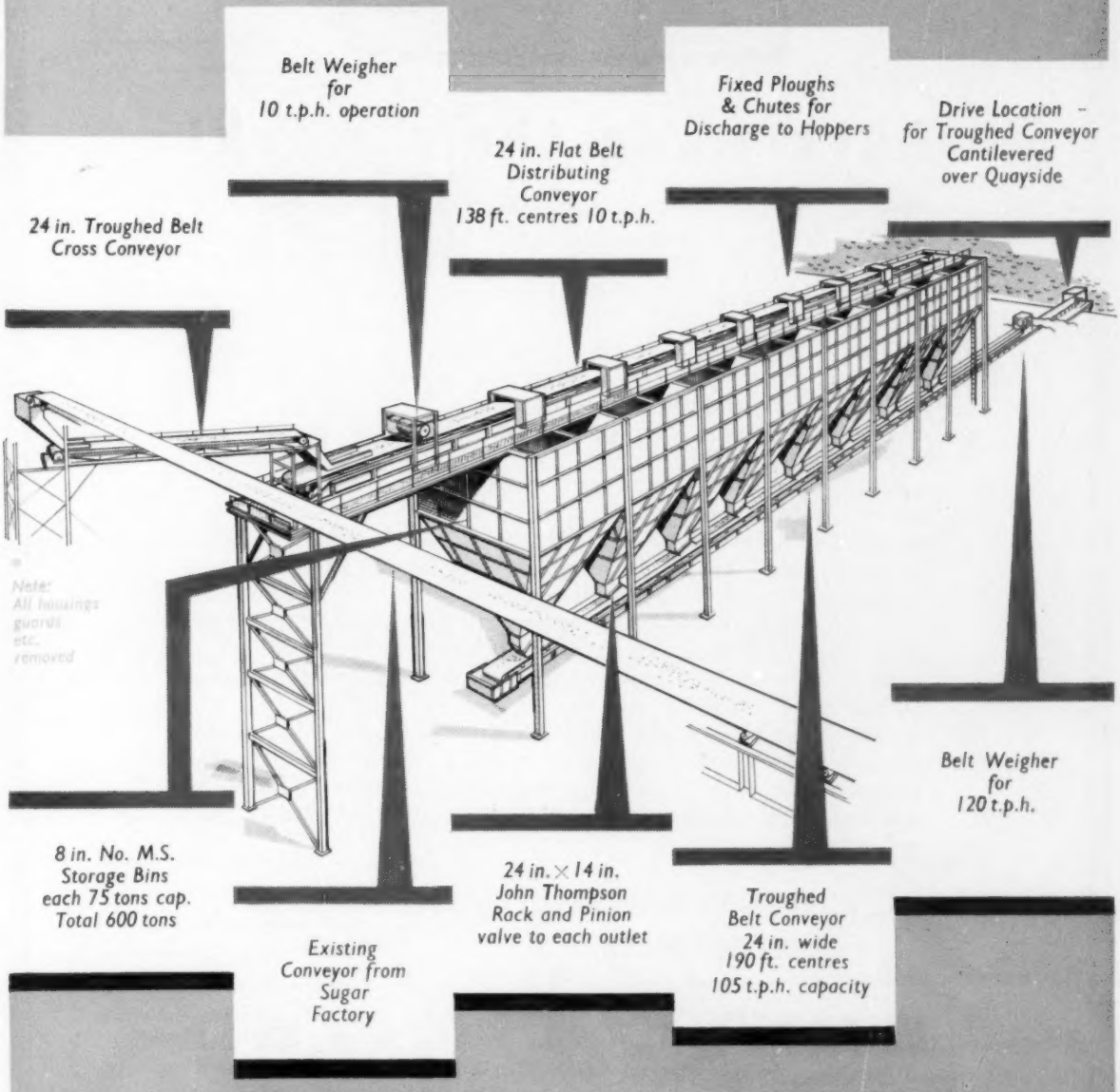
STRACHAN & HENSHAW LIMITED

STEELHOIST WORKS, BRISTOL 2, ENGLAND TEL. 78331

Bulk Sugar Handling and Storage Scheme

now under construction

For the Sugar Industry in British Honduras


Belt Weigher for 10 t.p.h. operation
Fixed Ploughs & Chutes for Discharge to Hoppers
Drive Location – for Troughed Conveyor Cantilevered over Quayside
24 in. Flat Belt Distributing Conveyor 138 ft. centres 10 t.p.h.
24 in. Troughed Belt Cross Conveyor
Note: All housings guards etc. removed
Belt Weigher for 120 t.p.h.
8 in. No. M.S. Storage Bins each 75 tons cap. Total 600 tons
24 in. × 14 in. John Thompson Rack and Pinion valve to each outlet
Troughed Belt Conveyor 24 in. wide 190 ft. centres 105 t.p.h. capacity
Existing Conveyor from Sugar Factory

Complete sugar handling facilities, comprising belt conveyors, bucket elevators, screw conveyors (of all types) vibratory and carrier chain conveyors, together with sack handling equipment and ship loading and unloading plant can be designed and manufactured by:—

JOHN THOMPSON CONVEYOR CO. WOLVERHAMPTON

CP 16

Trade Mark

have made their mark!

With this new mark, the Buell organisation emphasises the name under which we have continuously operated in the United Kingdom and overseas since we were established in the United Kingdom in 1927. Buell was first formed to develop Patents relating to equipment for the preparation and burning of pulverized coal, but shortly after formation acquired the patent rights for "Van Tongeren" Dust Collection Equipment and "Büttner" Dryers. As a result of our own extensive experience, supported by the continued co-operation of these associations, the name of BUELL has become the symbol of a first-class engineering service in the solution of Industrial Drying and Dust Collecting problems. In 1954 as Buell (1952) Limited, we became a subsidiary of Edgar Allen & Co. Limited, Sheffield, and recently our name has been shortened to Buell Limited.

In the field of separation and collection of dust we offer complete equipment with the Buell High Efficiency Cyclones fabricated in various types of construction to meet the particular conditions dictated by the requirements of many industries. Buell Drying Plants are well known for their application to the drying of a wide range of materials. It is our policy to make a special study of the various problems involved before selecting the design of Buell Dryer to suit the individual case.

Under our new style "Buell Limited", we continue to offer the same high standard of service in the design, manufacture and erection of Buell Industrial Drying and Buell Dust Collecting Equipment based on extensive experience with the hundreds of plants now operating to our credit in the United Kingdom and overseas.

BUELL-VAN TONGEREN DUST SEPARATORS

BUELL-BÜTTNER DRYERS

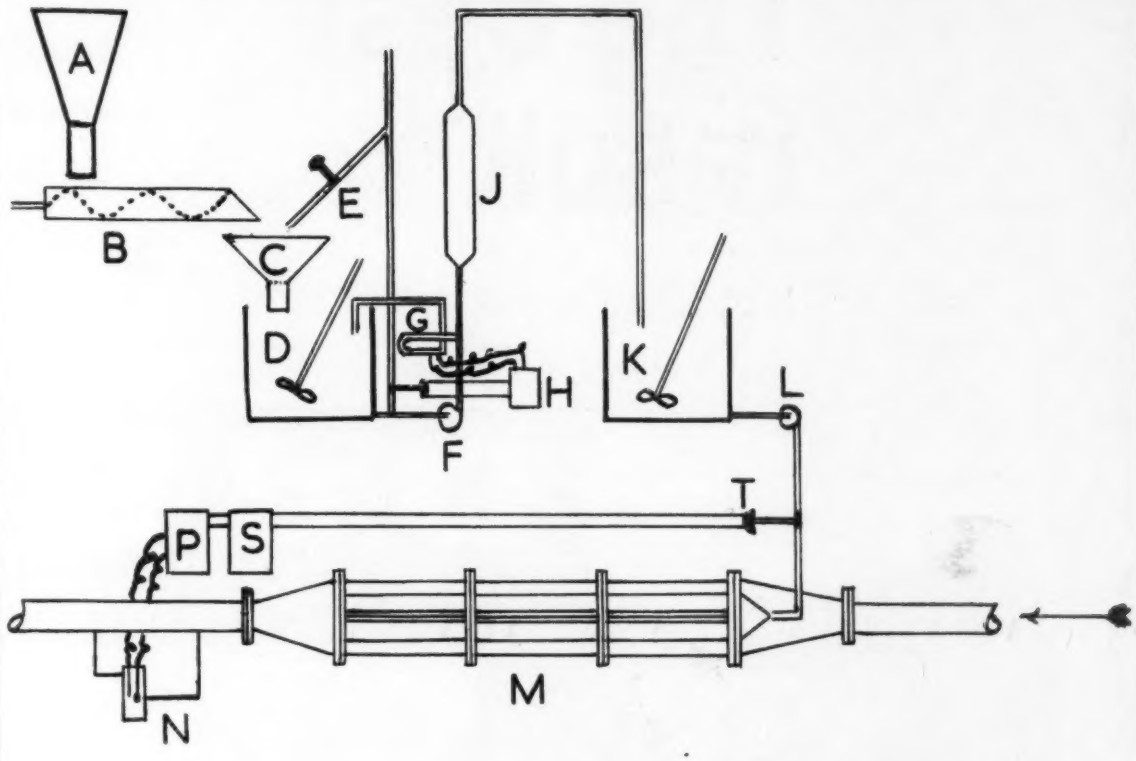
BUELL LIMITED

(a subsidiary of Edgar Allen & Co. Limited)

THREE ST. JAMES'S SQUARE · LONDON S.W.1

Telegrams: Allentare Piccy, London. *Telephone: Trafalgar 2528 (3 lines)*

A Suma Product



AUTOMATIC LIMING CONTROL

KEY TO SCHEMATIC DRAWING LAYOUT

A—Hydrated Lime Hopper

B—Screw Conveyor

C—Sieve-bottom Receiver Hopper.

D—Heavy Milk-of-Lime Tank with Stirrer.

E—Hand Operated Valve on Water Line.

F—Centrifugal Pump for Heavy Milk-of-Lime to Density Meter & Controls.

G—Density Meter, Continuous and Automatic.

H—Recorder/Controller for Continuous Density Control.

J—Stand-pipe for ensuring that Meter is always full.

K—"Correct" Milk-of-Lime Tank, with Stirrer.

L—Centrifugal Pump for "Correct" Milk-of-Lime to Process.

M—Mixer Unit.* (Patent Pending).

N—Flow-through Electrode System for pH Control.

P—pH Transmitter.

S—Recorder/Controller for pH Control of Liming.

T—Automatic Valve for Controlled Addition of "Correct" Milk-of-Lime to Mixer unit.

* See *I.S.J.*, 1958, 60, 213.

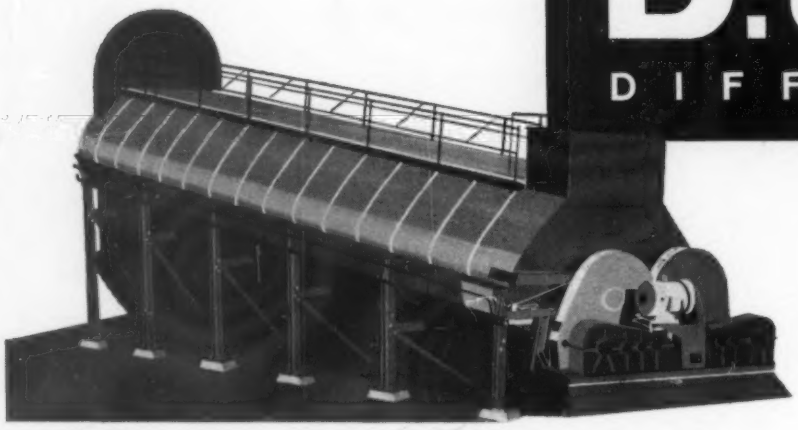
The Sugar Manufacturers' Supply Co. Ltd.

7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.

Cables: "Sumasuco, London."

The best result

is obtained by the



D.d.S.
DIFFUSION

AKTIESELSKABET DE DANSKE SUKKERFABRIKKER
COPENHAGEN · DENMARK

The lowest investment

The cheapest maintenance

The lowest draft and pulp losses

The smallest fuel consumption

The best pulp-pressing

IN OPERATION ALL OVER THE WORLD

International Sugar Journal

VOL. 62 *April, 1960* No. 736

Editor and Manager :
D. LEIGHTON, B.Sc., A.R.I.C.

Agricultural Editor :
H. MARTIN-LEAKE, Sc.D.

Assistant Editor :
M. G. COPE, A.I.L.(*Rus.*)

Panel of Referees

L. D. BAVER,
Director, Experiment Station, Hawaiian Sugar Planters' Association.

A. CARRUTHERS,
Director of Research, British Sugar Corporation Ltd.

F. M. CHAPMAN,
Technical Adviser, Tate & Lyle Ltd.

J. EISNER,
Technical Adviser, Booker Bros. McConnell & Co. Ltd.

P. HONIG,
Consulting Sugar Technologist.

J. CAMPBELL MACDONALD,
Chief Technical Officer, British Sugar Corporation Ltd.

H. C. S. DE WHALLEY,
Consultant, Tate & Lyle Ltd.

O. WIKLUND,
Swedish Sugar Corporation.

* * *

Published by:
The International Sugar Journal Ltd.
Central Chambers, The Broadway,
London, W.5.
Telephone : EALing 1535
Cable : Sugaphilos, London.

* * *

Annual Subscription : 32s 0d. or $5.00 post free
Single Copies : 2s 6d or 45 cents post free

PAGE

Notes and Comments 85
U.S. Sugar Act and Cuba. The Russian purchase and the sugar market. Second Mauritius cyclone. Latin American Free Trade Association. Cuban sugar crop 1960. Mexican sugar crisis.

* * *

Agricultural Articles :

A Study on the Possible Existence of Variety Yield Decline in the Argentine 87
By Dr. William E. Cross.

The Sugar Cane in British Guiana 89

Agricultural Abstracts 90

* * *

General Articles :

The Development of Hydraulic Gear for Cane Mills. (Part I) 91
By L. A. Tromp, A.M.I.Mech.E.

Apparatus for Counter-Current Extraction in the Laboratory 95
By C. J. Asselbergs, J. F. Hengeveld, P. W. van der Poel and H. I. Waterman with collaboration the of H. W. Saeys and H. K. Kroeze.

Indian Bagasse Paper Factory 98

Correspondence 98

* * *

Sugar-House Practice 99
Continuous sugar melter. Bulk handling in the Dominican Republic. New Rio Haina facility in operation. Operation of a 150-ton "Suchar" process refinery. Clarification of juice. The "Alrubar" process *etc.*

Beet Factory Notes 101
Intensification of 2nd product crystallization with air ventilation. Electromagnetic treatment of juice going to the evaporator. Removal of mud from second carbonatation juice with a hydrocyclone *etc.*

New Books and Bulletins 105
Handbook of Cane Sugar Engineering. F. O. Licht's Internationales Zuckerwirtschaftliches Jahr - und Adressbuch 1958/59. Sugar in the West Indies and British Guiana.

Laboratory Methods 106
Cationic dye adsorption in sugar cane juice. Determination of the moisture content of beet pulp. Paper chromatographic determination of raffinose in molasses. Quantitative determination of lactic acid in sugar factory juices *etc.*

By-Products 109
Viscose pulps from sugar cane bagasse. Final molasses and feed for cattle *etc.*

Patents 110
Removing pulp from treatment (beet diffusion) towers. Beet harvester. Crushing mills. Ruminant feed. Process for separating (bagasse) pith from fibre. Continuous sub-atmospheric diffusion of sugar *etc.*

Trade Notices 113
Weigher and bag-filler. The "Minican" Temperature Recorder. Continuous "Feedometer". Automatic weigher for conveyed material *etc.*

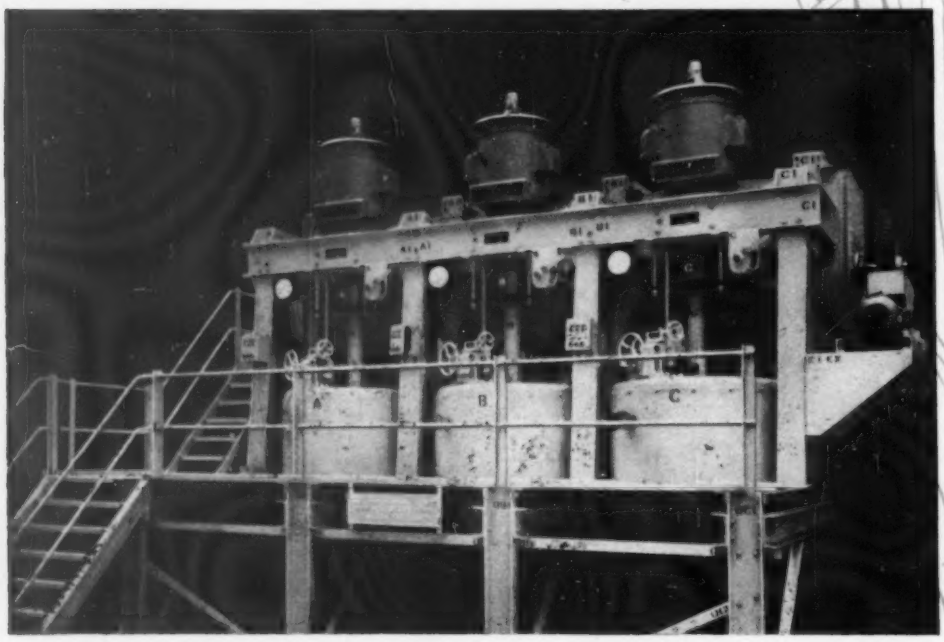
United Kingdom Sugar Imports and Exports 115

Brevities 116

Stock Exchange Quotations 116

Index to Advertisers lii

TOP GRADE MACHINES
FOR TOP GRADE . . .
SUGAR



✳ DESIGNED FOR EFFICIENCY AND RELIABILITY

DESIGNERS AND MANUFACTURERS
OF MODERN
CENTRIFUGAL MACHINES

There is no magic formula to replace experience but YOU can profit by OUR vast experience of the sugar industry. CENTRIFUGALS with Electric Drive; Water drive, or Belt drive. CENTRIFUGALS for all grades of sugar. CENTRIFUGALS for all sizes of factories. We design and make centrifugals which provide long, economical, trouble-free service. Ask us to send you a copy of our publication B59.

WATSON LAIDLAW
AND COMPANY LIMITED

98 LAIDLAW STREET, GLASGOW C.5.

Telephone: **SOUth 2545** *Telegrams:* **'Fugal' Glasgow**

THE
INTERNATIONAL SUGAR JOURNAL

VOL. LXII APRIL, 1960 No. 736

NOTES AND COMMENTS

U.S. Sugar Act and Cuba[1].

A Bill has been presented to Congress to extend the existing Sugar Act for a period of four years commencing in 1961. Full details have not yet been forthcoming but it is known to include a provision enabling the President to vary foreign quotas should such a step be considered expedient. It also contains a measure changing the method of reallocating territorial deficits. There is some uncertainty as to the reception the Bill will have as it is known that the Chairmen of the Agricultural Committees of both the House of Representatives and the Senate would prefer a single year extension.

The State Department in Washington has emphatically rejected the charge made by the Cuban newspaper *Revolución* that the new Sugar Bill constituted "economic aggression" against Cuba[2]. The Department's spokesman, Mr. LINCOLN WHITE, issued this denial at a press meeting where he was asked to comment on a statement by Major GUEVARA, Head of the Cuban National Bank, on March 2nd that high U.S. prices for Cuban sugar meant "economic slavery" for his country. In the prepared statement in response, Mr. WHITE remarked "It would be logical to conclude from Major GUEVARA's remarks that he considers such "enslavement" would end were we to abandon our preferential treatment as regards Cuban sugar and pay the lower world price (3 cents compared with 5 cents/lb). Cuba and other offshore sugar producers have the same status as U.S. producers. Cuban exporters therefore receive a price advantage which last year amounted to about 150 million dollars more than they would otherwise have obtained had Cuba been obliged to sell the amount delivered to the U.S. at world market figures."

A source of American irritation is the amount of favourable publicity given to the recent Russian agreement to purchase a million tons of Cuban sugar per year for five years at a price of 2·75 cents per pound; the U.S. has for years been taking some 3,000,000 tons of Cuban sugar a year and the price it is paying is currently nearly twice that to be paid by the U.S.S.R. In spite of this, the U.S. is subjected to a continual stream of violently anti-American abuse from the Cuban authorities. It is to be hoped that tempers will cool and that a realization of the benefits that U.S. and other foreign interests have brought and can bring to the Cuban people will bring about a reconciliation which will ensure that the variation of a Cuban quota or, as has been proposed, a levy on Cuban sugar to recompense owners of expropriated properties, need not be adopted.

* * *

The Russian purchase and the sugar market.

In our last issue we mentioned news of an agreement whereby the U.S.S.R. was to import a million tons of sugar a year for the period 1960/64 inclusive. Reaction to the news has been remarkably small. After an initial ten-point rise, the price on the New York market fell again and has stayed steady, well below the floor level of the International Sugar Agreement. This is all the more surprising when it is realized that the U.S.S.R. is nominally an exporter of sugar under the Agreement, that the amount of Cuban sugar to be taken in 1960 is approximately one-sixth of all the sugar sold on the world market, and that the quotas as set by the International Sugar Council are such that there is a statistical deficit of over half a million tons. Nevertheless, it has been suggested that the market has feared that, while both Russia and Cuba have stated that the sugar is for internal consumption in the U.S.S.R., this might mean that it would displace Russian white sugar which would go to neighbouring countries and thus liberate sugar from the East European countries which would then enter the world market.

Early in March, however, it was announced that East Germany was to take 60,000 tons of Cuban raws, and on the 16th Poland bought a further 50,000 tons. This would indicate that the poor crops during the past campaign have been such as to discount the fears mentioned above, and, in fact, the price has rallied slightly.

An important factor is that the International Sugar Council, due to hold its next meeting on March

[1] C. Czarnikow Ltd., *Sugar Review*, 1960, (448), 56.
[2] *Public Ledger*, 12th March 1960.

30th, may consider whether to increase quotas in spite of the price below the floor level (by suspension of the first clause of Article 21) or to leave them as they are until the recent cut of 2½% is restored by a rising market price. It would seem that the market is waiting for the result of the meeting.

* * *

Second Mauritius cyclone.

On the 28th February, Mauritius was struck by the most intense cyclone that has existed in the south-west Indian Ocean since anemometers and barometers came into use[1]. In the west of the island gusts of 160 m.p.h. were measured, in the north and east nearly 150 m.p.h. and in the south east 130 m.p.h. Near mountain ranges the wind probably exceeded 175 m.p.h. Mean wind speed over a whole hour reached 105 m.p.h. In the centre of the cyclone a barometric pressure of 942 millibars (707 mm) was read, the lowest recorded in the southwest Indian Ocean.

Very extensive damage was caused to public buildings, commercial buildings, churches, schools, hospitals and to houses of all categories. The number of homeless approximates to 69,000 and 42 fatal casualties have been recorded so far. Many sugar factories have been damaged. The standing crop, which had already suffered from an intense cyclone in January[2], has been severely hit but it is not possible, at this stage, to give an estimate of the loss sustained.

C. Czarnikow Ltd.[3] report that "canes which had been flattened were lifted and made to lie in the reverse direction. It is estimated that as a result at least 25% of the cane in most parts of the island was broken whilst the balance was left flat and bereft of leaves. . . . Much depends on weather conditions during the next few months but on such data as can be obtained at the moment it is forecast that the reduction in outturn will be of the order of 50% or perhaps even more. Warehouses and docks have been badly damaged and about 25,000 tons of sugar in storage at the waterside are said to have been affected in varying degrees, about 6000 tons being considered completely lost."

* * *

Latin American Free Trade Association[4].

On 18th February in Montevideo seven countries —Argentina, Brazil, Chile, Mexico, Paraguay, Peru and Uruguay—signed the treaty establishing the Latin American Free Trade Association. The Treaty, which provides for the gradual elimination, over 12 years, of Customs duties and restrictions on essential trade between the members, will become effective when ratified by at least three signatory countries.

The signing of the treaty was originally expected on 17th February but was delayed by Brazil's request for an escape clause which would have allowed any member to leave the Association on two years' notice, instead of the ten years proposed in the draft. Compromise was eventually reached on a six-year period of notice.

No official reason for the Bolivian decision not to participate was given, but it is generally believed that it was caused by the refusal of the other nations to give Bolivia the preferential treatment she requested.

Montevideo has been chosen as the seat of the committee which will draw up the rules of the Association, calculate the contributions to be made by each member, and prepare statistical studies as a basis for the first series of negotiations on tariff reductions. In these tasks it will receive technical assistance from the United Nations Economic Commission for Latin America and the Inter-American Economic and Social Council for the Organization of American States.

* * *

Cuban sugar crop 1960[5].

The Cuban crop was fixed by decree on 21st January at 5·5 million Spanish long tons.

Individual quotas are as follows:—

	Brought forward from 1959	1960 *Crop*	*Total Availability*
		Spanish tons	
Local Consumption.....	—	350,000	350,000
U.S. Free	369,145	2,305,816	2,674,961
U.S. Retained	—	500,000	500,000
World Free	995,165	204,835	1,200,000
World I.C.E.A.	—	995,143	995,143
Obligatory Reserve (Art 13 (3))	—	292,969	292,969
Voluntary Reserve (balance)	—	851,237	851,237
	1,364,310	5,500,000	6,864,310

* * *

Mexican sugar crisis[6].

The Mexican Sugar Syndicate, faced with a probable surplus of 650,000 short tons of sugar, the consequent closing of the smaller among the 74 factories, and unemployment for about 100,000 workers, has recommended that strong representations be made to the United States to increase its import quota for Mexican sugar. The Secretary-general of the syndicate attributes the crisis to deficient planning. He said that two years ago a reserve of 200,000 tons a year was proposed, to avoid the anomaly of having to import sugar from Cuba. To meet Mexico's internal consumption (now just over a million tons), production soared to 1,700,000 short tons. He also criticized inefficiency in the industry, which included inadequate domestic distribution and wasteful burning of the bagasse.

[1] *Mauritius Sugar News Bull.*, 1960, (100).
[2] *I.S.J.*, 1960, **62**, 58.
[3] *Sugar Review*, 1960, (448), 56.
[4] *Fortnightly Review* (Bank of London & S. America Ltd.) 1960, **25**, 229.
[5] C. Czarnikow Ltd., *Sugar Review*, 1960, (441), 23.
[6] *The Times*, 29th February 1960.

A STUDY ON THE POSSIBLE EXISTENCE OF VARIETY YIELD DECLINE IN THE ARGENTINE

By Dr. WILLIAM E. CROSS.

IN his book "Sugarcane and Its Diseases"[1], C. W. EDGERTON states (page 52): "Cane varieties do not last indefinitely. Ordinarily a variety produces at its maximum for a few years and then the yields begin to drop. Eventually it is abandoned and other varieties substituted". And opinions expressed by many other authorities in recent years would seem to coincide with this, although perhaps only in regard to the new seedling varieties. For instance, G. C. STEVENSON[2] states: "The canes of northern India have endured for centuries, perhaps millennia; the Creole and, later, the Bourbon satisfied, till nearly this century, the West Indian need. Now, almost universally, variety succeeds variety in bewildering succession". Also N. J. KING[3] affirms: "The past 30 or 40 years have witnessed, with few exceptions, the yield deterioration of all commercial varieties." And quite recently, Dr. H. MARTIN-LEAKE[4] referring to South African agricultural data, says it "indicates the influence of varietal change in counteracting the deterioration which appears to be accepted almost universally as inevitable."

That this matter is the cause of much concern in the industry, would appear to be indicated by the fact that in the 10th Congress of the *ISSCT*, held recently in Hawaii, no fewer than six papers were presented on different aspects of varietal yield decline. In three of these, various possible contributory factors associated with the decline are studied—such as soils, improper cultivation, fungi, viruses, nematodes, insects, etc.—but it would not appear to be proven that any of these factors constitute the basic cause of the decline.

This matter is especially interesting to us in the Argentine, because as I stated in a recent paper[5], most of our commercial varieties have been cultivated here during some twenty years or more, and up to now have shown no signs of yield decline. On the contrary, the crop of 1958 was enormously greater than that of any previous year and the cane production of 1959 was so abundant that it was impossible to harvest it all, so that a considerable proportion had to be left standing until next winter.

The apparent absence of "running out" of the varieties grown here is especially interesting, because they are grown under conditions which one would think might tend to favour yield decline. For the cane is usually cultivated up to six or more stubble years—generally without filling in the gaps which form in the rows—and is then replanted in the same fields, without rotation or fallowing; the cultivation is frequently not so thorough as it should be; the stubbles of the cane which is cut in the first half of the crop have to lie dormant until the winter is over, during which time they tend to suffer deterioration in various ways; and the cane is frequently exposed to serious droughts, and to severe frosts.

The opinion that as yet there has been no "running out" of the varieties cultivated is based not only on the general impression of the planters but also on statistical data. Thus the annual production of cane and sugar per acre in the whole of the Argentine from 1946 (the first year after the smut epidemic, when the replanting of all the fields with resistant varieties had been completed) to 1958 suffered no decrease during this period, as is shown by the data, in terms of long tons per acre, presented in Table I.

Table I

PRODUCTION OF CANE AND SUGAR PER ACRE[6]

Year	*Tons of cane*	*Tons of sugar*
1946	12·6	1·05
1947	12·7	1·11
1948	12·9	1·03
1949	13·4	1·07
1950	13·7	1·16
1951	13·1	1·04
1952	13·5	0·87
1953	13·8	1·04
1954	13·6	1·10
1955	13·0	0·81
1956	12·2	0·95
1957	13·2	0·94
1958	14·4	1·22

Also we have more specific evidence as to the yields of each different variety, in Tucumán, by comparing the production obtained in the Tucumán Experiment Station in the years up to 1944, with that in the much later period of 1951 to 1956, in the private experimental farm I conducted for the factory owners. As the cane is cultivated here for several stubble years, I have calculated the average production of cane and sugar per acre for each "age" (Plant, 1st stubble, etc.) during the two periods. These calculations I have made for all our commercial varieties, with concordant results, but for reasons of space I present here only those of the Tuc.2645 (which occupies about half of the total area cultivated in Tucumán), Tuc. 1149, Tuc. 2683, Co 290 and POJ 2878 including these last two, which do not occupy very great extensions here, because of their general interest in many other countries. These data, in terms of long tons per acre, are presented in Table II.

In considering these results it should be borne in mind that in this country all the cane is harvested in the winter of each year, so that the production is the result of less than twelve months' growth.

[1] Louisiana State University Studies, Biological Science Series, (3). (L.S.U. Press, Baton Rouge). 1955.
[2] *I.S.J.*, 1948, **50**, 258.
[3] *I.S.J.*, 1954, **56**, 127.
[4] *I.S.J.*, 1959, **61**, 259.
[5] *I.S.J.*, 1959, **61**, 195.
[6] These data do not include those of the cane which was used for planting.

Table II

COMPARISON BETWEEN YIELDS OBTAINED WITH DIFFERENT VARIETIES UP TO 1944, AND IN THE PERIOD 1951 TO 1956

"Age" of Cane	Average yields up to 1944: Tons cane per acre	Factory yield %	Tons sugar per acre	Average yields 1951 to 1956: Tons cane per acre	Factory yield %	Tons sugar per acre
			Co 290			
Plant	37·98	8·51	3·23	36·03	9·55	3·44
1st stubble	31·50	7·84	2·47	32·35	7·96	2·58
2nd stubble	25·83	8·62	2·23	34·50	8·74	3·02
3rd stubble	24·14	9·20	2·22	31·70	8·31	2·63
4th stubble	18·38	9·69	1·78	33·22	8·39	2·79
			POJ 2878			
Plant	29·65	10·79	3·20	35·85	8·12	2·91
1st stubble	26·35	6·84	1·80	31·69	7·35	2·33
2nd stubble	34·97	8·00	2·80	29·86	5·92	1·77
3rd stubble	31·20	9·09	2·84	28·38	10·09	2·86
4th stubble	26·99	9·67	2·61	27·32	7·84	2·14
5th stubble	25·55	8·64	2·21	23·78	8·41	2·00
			Tuc. 1149			
Plant	23·96	9·54	2·29	28·11	6·41	1·80
1st stubble	28·81	8·40	2·42	32·33	8·80	2·85
2nd stubble	28·40	8·63	2·45	33·14	9·46	3·13
3rd stubble	17·85	9·36	1·67	28·75	7·72	2·22
4th stubble	25·51	9·36	2·39	29·46	8·13	2·40
5th stubble	25·48	8·84	2·25	26·90	8·74	2·35
6th stubble	20·34	9·82	2·00	30·23	8·42	2·54
7th stubble	23·06	8·77	2·02	28·85	8·14	2·35
			Tuc. 2645			
Plant	32·57	8·22	2·68	29·50	9·17	2·70
1st stubble	34·39	9·22	3·17	39·18	8·86	3·47
2nd stubble	32·01	9·00	2·88	34·70	9·61	3·33
3rd stubble	26·81	9·06	2·43	30·90	9·54	2·95
4th stubble	25·85	9·00	2·33	27·32	8·85	2·42
5th stubble	26·70	9·56	2·55	24·51	9·69	2·38
6th stubble	23·49	7·34	1·72	20·59	9·97	2·05
			Tuc. 2683			
Plant	29·43	8·25	2·43	26·73	9·15	2·45
1st stubble	29·32	8·53	2·50	44·20	7·73	3·41
2nd stubble	31·96	9·17	2·93	36·50	8·77	3·20
3rd stubble	28·43	8·02	2·28	31·25	9·23	2·88
4th stubble	29·04	9·68	2·81	31·00	8·18	2·54
5th stubble	34·07	8·72	2·97	25·61	8·81	2·26

I submit that there is no evidence in these results of any yield decline having taken place in any of these varieties. And this is true also for our other important commercial canes. These I did not include in the table for the reason mentioned, but I will just give some average yields regarding them, for the 1951–1956 period, to show that they have by no means "run out". These data I present in Table III, including in each case the yields of plant cane and of old stubbles.

It is interesting to observe also that while in this country in the course of the present century the commercially cultivated varieties had to be replaced by others on two different occasions—in 1915–1917, and in 1943–1945—this was in no way due to any yield decline, being caused, on the contrary, by virulent disease epidemics. In the first case, the then commonly planted purple and striped "native" canes, which had been cultivated for nearly a century —since the foundation of the industry—with satisfactory results, and which in the years 1913 and 1914 gave unprecedentedly big crops, in 1915–1917 were suddenly attacked by a most malignant form of the mosaic disease which wiped out altogether at least half the cane and greatly diminished the production of the rest. In this situation these varieties had to be abandoned and replaced by the mosaic-tolerant POJ 36 and POJ 213. These varieties continued to occupy nearly all the area under cane, especially in Tucumán—giving yields which were considered as quite satisfactory—until 1943–1945, when they were attacked suddenly, with great virulence, all over the country, by the smut, to which they proved to be specially susceptible, so that they had to be replaced with all urgency with the resistant varieties now cultivated. In neither of these cases was it a matter of yield decline, or of the varieties "running-out".

Table III.

AVERAGE YIELDS OF PLANT AND OLD STUBBLE CANE OF OTHER VARIETIES IN THE PERIOD 1951—1956

Variety	*"Age"*	*Tons cane per acre*	*Tons sugar per acre*
Co 270	Plant	29·79	3·56
	7th stubble	24·73	2·14
Co 413	Plant	27·92	2·64
	7th stubble	29·27	2·35
Co 421	Plant	33·45	2·48
	6th stubble	30·46	2·54
CP 29/116	Plant	26·65	1·82
	8th stubble	35·04	3·36
CP 34/120	Plant	19·33	1·77
	6th stubble	29·04	2·87
Tuc. 1111	Plant	20·70	2·27
	6th stubble	21·74	1·98
Tuc. 3342	Plant	25·42	1·59
	7th stubble	37·56	3·13
Tuc. 4268	Plant	36·74	2·31
	6th stubble	25·55	2·28
Tuc. 4441	Plant	37·46	2·66
	6th stubble	35·38	2·74

Sugar beet yellows in Great Britain, 1958. R. HULL. *Plant Pathology*, 1959, **8**, 145.—Extensive spraying with systemic insecticide (to control aphis) combined with wet stormy weather in June considerably reduced the incidence of this virus disease in the 1958 season. Field sampling showed an average of 0·3, 4·2, 14·1 and 20·7% of plants infected at the end of June, July, August and September respectively. About a quarter of the entire crop of 413,700 acres was sprayed. At the end of September prevalence of beet yellows was 2½ times more in unsprayed fields than in sprayed ones in the same locality. A single spraying increased yields by 7–8% on average. At the end of the season the disease was, as usual, worst in Suffolk, Essex and south Cambridgeshire (30–50%) and least in Yorkshire and Scotland (1–4%).

Simazine

A new departure in weed control

One single pre-emergent application keeps young cane weed-free for months

persistent selective safe

Simazine products for weed control in sugar cane are available

in the USA and Puerto Rico through the distributors of Geigy Agricultural Chemicals, Ardsley, N.Y., as **Geigy Simazine 80 W**

in Central and South America, Cuba, Haiti, the Dominican Republic, South Africa, the Philippines and Taiwan through the local distributors of J. R. Geigy S.A., Basle (Switzerland), as **Gesatop**

in the British Commonwealth (other than Australia) through Fisons Chemicals (Export) Ltd., 95 Wigmore Street, London, W1, as **Simazine 50 W**

CANE SUGAR MACHINERY

Complete Raw Sugar Factory
Capacity 2500 tons of Cane per Day
Designed and Equipped by John McNeil & Co. Ltd.

JOHN McNEIL & CO. LTD.

COLONIAL IRON WORKS,
GOVAN,
GLASGOW, S.W.1

Telephone Nos. GOVAN 1246-7-8

Telegraphic Address "Colonial, Glasgow"

THE SUGAR CANE IN BRITISH GUIANA

SUGAR Bulletin No. 27 of the Department of Agriculture, British Guiana, deals with the progress made during 1958 and should be read in conjunction with earlier Bulletins covering the same ground[1]. The season was characterized by an overall deficit of 29·51 inches in the rainfall in spite of an excess of 12·38 inches in April, the major deficits occurring in July (8·40 inches) and December (10·51 inches).

Variety Trials

The extensive series of variety trials need a reference bearing little relation to the extent of labour involved in their execution for, in the words of the Report, "they do not result in any marked change in the varietal position". B 41227 and B 37161 remain the leading varieties. In yield, they are, in general, surpassed by B 49119, B 47258 and D 141/46, but B 49119 is susceptible to leaf scald, B 47258 is a soft cane, heavily attacked by rats and D 141/46 primarily an autumn crop cane. On the basis of the information available, an identical planting programme is recommended for each region consisting of B 41227 55% B 37161 25%, B 47258 15% with the remaining 5% divided between D 141/46, B 4362, B 45137 and D 37/45.

The growth and ripening studies of the four varieties B 41227, B 37161, D 37/45 and D 158/41 carry to the third ratoon the earlier studies of the same varieties. Among the very varied features disclosed and the complex inter-relations between such factors as age, number and rate of growth of the several stalk categories, arrowing and others, perhaps the most interesting is the dual peak in the yield curve of an arrowing crop, the first at from 9 to 12 months before arrowing and the second at 15 months. The extent of the intervening fall depends on climatic and varietal factors. In a non-arrowing crop the same two peaks may occur, but these coincide with the respective periods of maturity of the primary and secondary stalks. The relationship between the pol % cane and yield of sugar up to the first peak is fairly close, subsequently subject to wide variation.

Fertilizer Experiments

These experiments cover the first and second ratoons of earlier crops; they are concerned with liming, relative value of different phosphatic fertilizers and variety fertilizer relationships. Liming continues to produce an increase of P_2O_5 in juice with increases of both it and potash in the dry leaf. The five phosphatic fertilizers tested again showed no significant differences. In the last series, too, there were no significant differences, only trends favouring B 41227 at lower, and D 37/45 at higher N levels.

Cultivation Experiments

As noted in the previous Report, the comparison between the Cameron-Williams and Standard systems has been continued into the second cycle as a long-term experiment and the results of the first ratoons of this cycle are presented. Both the yield of 96° sugar per acre and juice purity were higher in the Cameron-Williams system (yield 6·31 and 5·62 tons and purity 86·2 and 84·0 respectively), but tons cane/tons sugar was lower (8·20 and 8·47 respectively).

Varietal and Fertilizer Position

The varietal position, given in extensive regional tabulated statements, shows little change. B 37161 at 42·8% total acreage, has forged ahead of B 41227 with 33·6%. B 47258 (5·6%) alone occupies over 5%. An increased use of urea at 1004 tons (1957 figure 488 tons) is the only marked change in the fertilizer position.

Leaf Scald

The Report ends with a tabular statement of the varietal position with respect to leaf scald under the ratings very susceptible, susceptible, susceptible-tolerant, tolerant and resistant.

H.M.-L.

Control of the important sugar cane pests in Puerto Rico. L. F. Martorell. *Sugar J.* (La.), 1959, **22**, (1) 55–63.—After detailing a long list of pests, the more important are dealt with seriatim. *Diatraea saccharalis* has not been kept under satisfactory biological control, and recourse has been made to insecticides with "Endrin" and BHC the most effective. The same is the case with the yellow aphis (*Sipha flava*) using "Malathion." For soil-inhabiting pests resort is being made to BHC and "Aldrin."

* * *

Sugar cane variety trials in Puerto Rico, 1952–57. F. Mendez-Roig *et al. Sugar J.* (La.), 1959, **22**, (1), 64-68.—A review is given of the varietal trials conducted over the 6 year period and the results summarized in tabular form with the agronomic characters, including resistance to mosaic and chlorotic streak, indicated by a numerical code of excellence.

* * *

Filter press muds and bagasse are valuable organic fertilizers. W. L. Owen. *Sugar J.* (La.), 1959, **22**, (2), 18–21.—The article is largely a review of the progress made in many countries in the matter of composting, and attributes to the imponderable factors, such as antibiotics contained, rather than to the actual nutrient content, the benefits which result from the use of the product. The advantages of including trash among the compostable material are also noted.

[1] *I.S.J.*, 1958, **60**, 349.

Opportunities for savings in cane transport. *Cane Transport News*, 1959, **2**, (4), 1–4.—The four-page issue notes that the major openings for savings are in the elimination of trans-loading and simplification of the means of hauling from the field. Individual brief articles discuss different aspects and experiences; that at Kekaha points to rail haulage being obsolescent with replacement by semi-trailers. The adoption of these together with 100% mechanical harvesting adds problems of storage at the mills. Transport by helicopter, as originally described in the South African Sugar Journal, is not practicable at present on account of its high cost.

* * *

Increase of chromosome number in species-hybrids of *Saccharum* in relation to the embryo-sac development. G. BREMER. *Bibliogr. genet.*, 1959, **18**, 99 pp.; through *Plant Breeding Abstracts*, 1959, **29**, 2897.—A complete report is presented of cytoembryological investigations of which a brief account has appeared earlier[1]. The chief cane investigated was POJ 2875 (POJ 2364 × EK 28) with $2n = 110$, representing a third nobilization of *S. spontaneum*. The other clones investigated were POJ 2364 (POJ 100 × Kassoer) with $2n = 148$, representing a second nobilization; POJ 2878 ($2n = 119$), with the same parentage as POJ 2875; POJ 2940 ($2n = 97$) from POJ 2722 × EK 28, POJ 2944 ($2n = 120$) from POJ 2875 × EK 28 and POJ 2947 ($2n = 120$) from POJ 2875 × SW 3, all these clones representing fourth nobilizations; *S. officinarum* 'Bandjarmasn hitam' and D 152, both with $2n = 80$; G 107 (*S. officinarum* × *S. spontaneum*), $2n = 136$; 1228P2 (POJ 2875 × *S. spontaneum*), $2n = 166$; *S. barberi* 'Maneria', $2n = 91$; and five Javanese clones of *S. spontaneum*, $2n = 112$. Reduction to the haploid number during meiosis I was observed in all the clones Subsequently one of the following events occurred: (1) The chromosome number remained reduced, probably in those cases in which meiosis I and II were followed quickly by transition of the nucleus of the chalazal cell of the megaspore tetrad into the resting stage, the other cells of the tetrad degenerating. (2) The ovule became sterile as the result of degeneration of all the cells of the tetrad. (3) Re-doubling took place by endoduplication of all the chromosomes in the chalazal cell. (4) Some but not all of the chromosomes divided in the chalazal tetrad nucleus. (5) The reduced number was restored to the unreduced number by endoduplication of all the chromosomes in the nucleus of the chalazal cell of the dyad after normal meiosis I, this nucleus developing into the primary nucleus of the embryo sac without undergoing meiosis II. (6) In relatively rare cases, chromosomes dividing in the chalazal nucleus of the dyad again divided, so that a tetraploid embryo sac was formed. These observations were verified by hromosome counts of dividing nuclei in young embryo sacs and in the embryo and endosperm. In *S. spontaneum*, the formation of reduced ♀ gametes predominated. Many ovules were sterile in POJ 2875 Bandjarmasin hitam and Maneria. Ovule sterility was absent or rare in POJ 2878 and three *S. spontaneum* clones. Doubling of the chromosomes in the chalazal nuclei was most frequent in POJ 2875. The author gives a comprehensive discussion of these findings in relation to the results he has obtained in interspecific hybridization of *Saccharum* and those of other investigators. He reaches the conclusion that increases in chromosome number attributable to the ♀ parent may in most cases be interpreted on the basis of complete or partial endoduplication during megasporogenesis, whether pseudogamy or fertilization occurs. Wide differences may exist between reduced and unreduced ♀ gametes of a particular parent as regards compatibility with the same ♂ parent, the tendency towards parthenogenesis playing an important part in this connexion. The author also considers the rôle of the ♂ parent in increasing the chromosome number, as well as reports of endopolyploidy in somatic and reproductive cells in *Allium* and other genera.

* * *

Diagnosis of ratoon stunting disease. *East African Agric. Forestry Res. Assoc. Ann. Rpt.*, 1958, 63–64.—Dr. F. M. L. SHEFFIELD, Plant Pathologist, points out that no really satisfactory diagnostic character is known so far for detecting this disease, in spite of its widespread occurrence throughout the cane growing countries of the world. Chemical reactions for detecting the disease, described by some authors, have proved quite unreliable in East Africa. The same applies to the red discoloration, red dots or "commas", (in longitudinal section) of the nodal tissues of mature canes. In East Africa this peculiar pink or red discoloration has sometimes been found in healthy cane. Sections of healthy and diseased cane were examined microscopically in the hope of finding some anatomical abnormality that might prove valuable for diagnostic purposes but without success. Certain graminaceous plants in East Africa are known to be symptomless carriers of the virus. These were similarly examined, but without result.

* * *

Work units and incentive plan. R. BIRD. *Sugar y Azúcar*, 1959, **54**, (11), 46, 47.—The system adopted for cutting cane at the Central Roig, Puerto Rico, is described in some detail.

[1] *Plant Breeding Abstracts*, 1959, **29**, 2712.

THE DEVELOPMENT OF HYDRAULIC GEAR FOR CANE MILLS

By L. A. TROMP, A.M.I.Mech.E.

PART I

IN 1871 hydraulic rams in the top caps of the cane grinding mills were applied for the first time by British manufacturers.

Compared with the rigid mills then being built, the advantages were such that the new accessory was soon to become a standard detail in cane mill construction. To maintain the hydraulic load on the top roller of the mill during fluctuations in the blanket thickness of the bagasse, an accumulator is required.

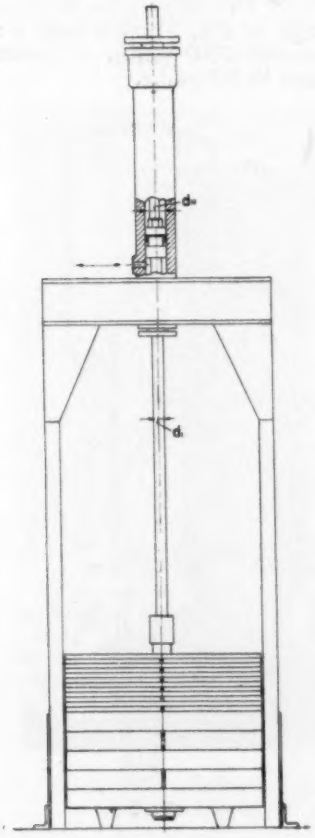


Fig. 1

Deadweight Accumulators

Of the D.W. accumulators two types are predominant, i.e. the suspended type as shown in Fig. 1 and the standing type of Fig. 2. The main feature claimed for the suspended type is that the counterweight does not exert a bending action on the accumulator spindle. Normally the counterweight is made up of easily removable cast iron plates of varying thickness, so as to enable changing of the load. The suspended type can be arranged for increased load at high lifts of the spindle by adding plates which are laid on pins in the steel columns.

Because it has a differential piston, the suspended accumulator requires a stuffing box on the lower end of the hydraulic cylinder and a cup or ring packing on the piston, both of which must withstand the hydraulic pressure.

For a given pressure the counterweight is calculated from:

$$W = \frac{\pi}{4} \times (d_{11}^2 - d_1^2) \times p \quad \ldots\ldots\ldots \quad (1)$$

in which

W = counterweight in lb,
d_{11} = diameter of piston in inches,
d_1 = diameter of rod in inches, and
p = hydraulic pressure in p.s.i.g.

Thus a 2"/ 3" accumulator requires a counterweight of 9,800 lbs for a hydraulic pressure of 2500 p.s.i.g. and 13,700 lbs for 3500 p.s.i.g.

For the standing accumulator in Fig. 2 only one stuffing box is required. The counterweight can be made up of round or square cast iron plates or as a cylindrical tank, as shown in the diagram, which is guided by a centre well around the 4 nerves cast integrally with the hydraulic cylinder.

Obviously the tank must be uniformly loaded with sand or scrap iron, so as to avoid jamming or bending of the plunger.

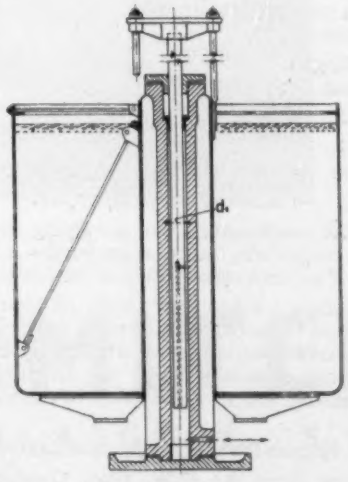


Fig. 2

The counterweight for the standing accumulator is obtained from:

$$W = \frac{\pi}{4} d_1^2 \times p \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Heavy mineral oil is used for filling the hydraulic system, which is easier to seal than a thin liquid, besides being non-corrosive and acting as a lubricant.

Usually one accumulator operates the two hydraulic rams in the top caps of the mill and the proportion between ram and plunger areas will be:

$$r = 2\ D^2 : d_1^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

in which

r = ratio of areas,

D = diameter of ram in mill cap, and

d_1 = diameter of accumulator plunger.

From any given lift of the rams, the stroke of the accumulator will amount to

$$S = r \times l \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

where:

S = stroke or lift of accumulator in inches.

l = lift of rams in inches.

Taking a 2 inch accumulator connected to two 12 inch rams, the ratio r thus will be $288 : 4 = 72$, which indicates that the lift of the rams will be small, as the maximum stroke of the accumulator generally does not exceed 36 inches.

So as not to throw out the plunger from the hydraulic cylinder, the oil is released by an oil duct when the safe limit of the stroke is exceeded.

When this happens there is a loss of hydraulic fluid and the system will not remain completely filled.

This means that the rams will not go down to their lowest position and re-filling by the hydraulic pump becomes necessary.

There is another phenomenon with D.W. accumulators, namely the inertia force acting during acceleration or deceleration with abrupt rise or fall of the counterweight.

According to Newton's law, this acceleration force has a value of:

$$P = m \times f \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

in which:

m = mass of counterweight = weight : 32·16.

f = acceleration in ft/sec/sec.

Now, the acceleration is of a varying and mostly unknown magnitude, but by assuming $f = 3$ ft/sec/sec the force P will not exceed 10% of the counterweight.

By attaching a manometer to the oil pipe between the rams and the accumulator, much heavier pressure increases have been observed, which may be due to pipe friction, especially when the oil pipes are of small diameter, and also to friction of the packing.

Hydro-Pneumatic Accumulators

Departing from the D.W. type, German manufacturers, some 50 years ago, applied the H.P. accumulator to cane grinding mills, the original design being shown in Fig. 3.

The hydraulic pressure acting on plunger d_1 must obviously be balanced by the air pressure acting on plunger d_{11}, according to the equation:

$$d_1^2 \times p_o = d_{11}^2 \times p_a \quad \ldots\ldots\ldots\ldots\ldots \quad (6)$$

in which:

d_1 = oil plunger diameter in inches.

d_{11} = air plunger diameter in inches.

p_o = oil pressure in p.s.i.g.

p_a = air pressure in p.s.i.g.

With the H.P. accumulators, not only does the previously mentioned ratio r according to (3) apply, but also the air/oil plunger ratio, which amounts to :

$$n = d_{11}^2 : d_1^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

The design of Fig. 3 has a ratio $n \simeq 7$, which means that with 3500 p.s.i.g. oil pressure, the air pressure must be 500 p.s.i.g.

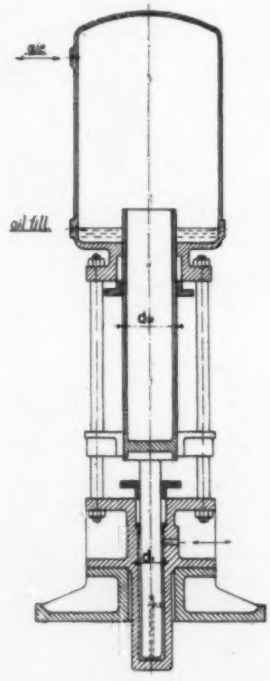


Fig. 3

This relatively high air pressure requires a high pressure air compressor and this may be the reason why this type of H.P. accumulator has not found ready acceptance amongst cane mill manufacturers. Because the ratio r is only 22 instead of 72 for the D.W. accumulator, the oil plunger is of larger diameter than is the case with the latter.

When the combined oil and air plungers are rising, the air and thus the oil pressure will increase and as

BLAIRS

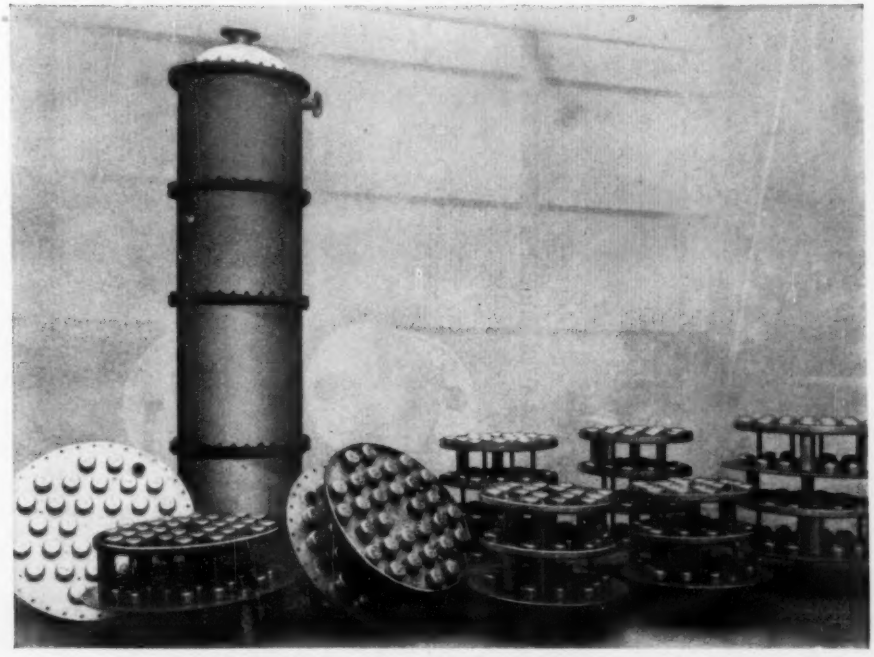
COMPLETE

SUGAR FACTORIES and REFINERIES

DISTILLERIES

ABSOLUTE ALCOHOL and CHEMICAL PLANTS

Sole Makers of *MULTIPLEX FILM EVAPORATORS*



Our illustration shows Rectifying Column with Plates for Stripping Column used in a Still producing 40% Formaldehyde. Column made of 99·5% Aluminium.

BLAIRS LIMITED

WOODVILLE STREET, GLASGOW, S.W.1

Cables: "Blazon Glasgow"

LONDON OFFICE:—38 GROSVENOR GARDENS, S.W.1

Cables: "Multivap Sowest, London"

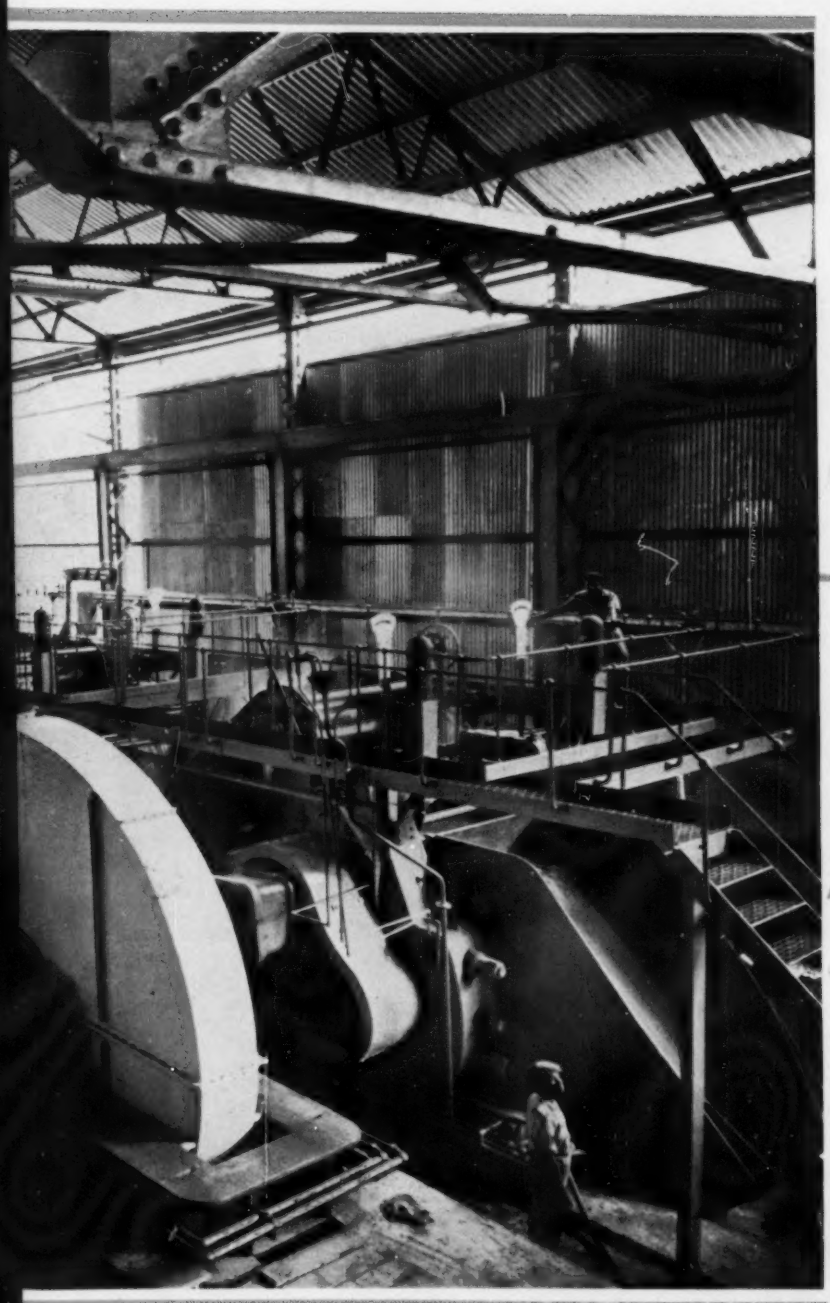
SMITH

SUGAR MILLS

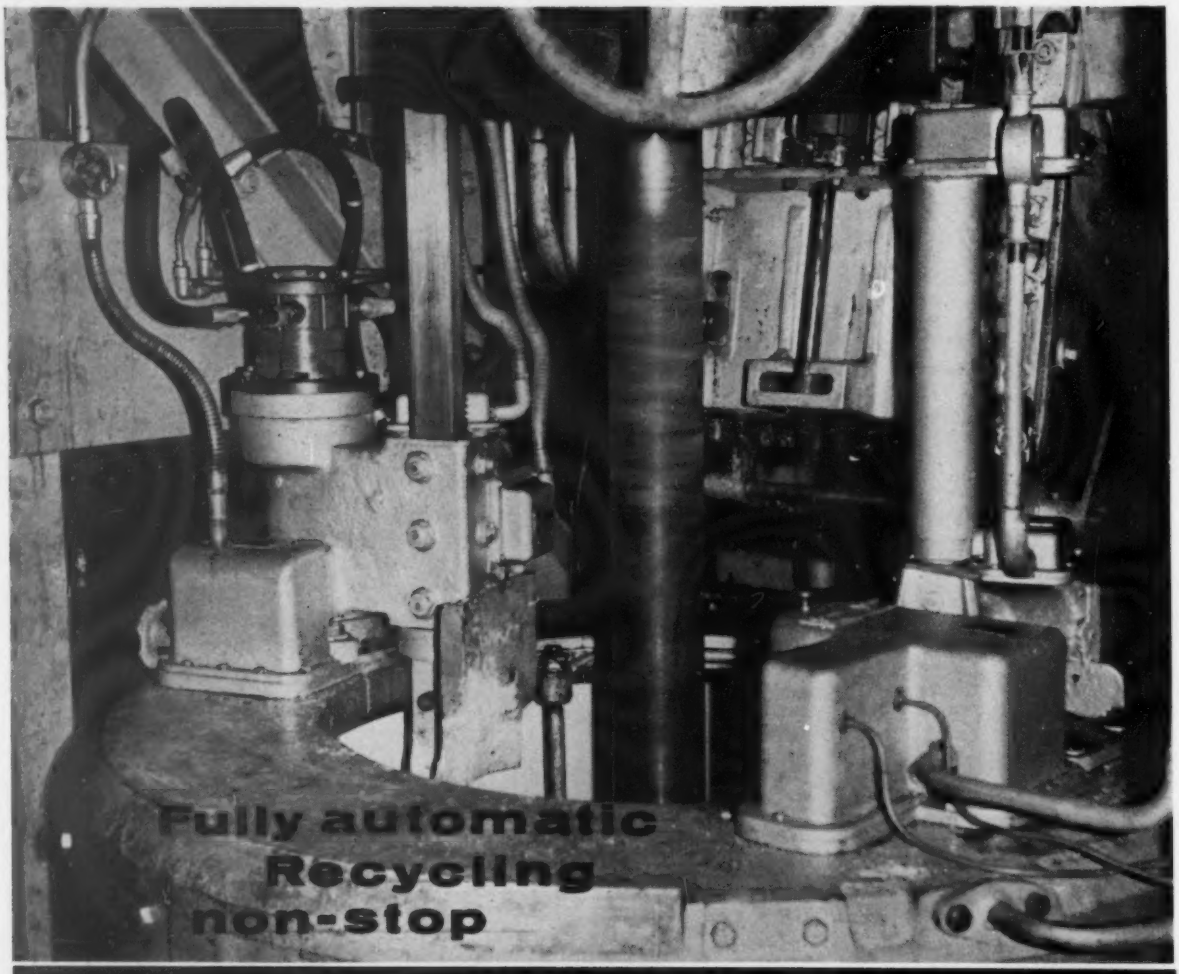
operate throughout
THE SUGAR WORLD

* MAURITIUS

The illustration shows a modern 15 Roller 35" × 72" Sugar Cane Milling Plant with individual Turbine Drives supplied to Deep River Beau Champ Ltd., Mauritius. The average grinding capacity figure for the first crop (1958) was 103 tons canes per hour. Extraction 96·2%. Cane fibre content 12·5%.



A. & W.
SMITH
& CO. LTD.
SUGAR FACTORY &
REFINERY ENGINEERS
21 MINCING LANE
LONDON · E·C·3
Cable Address: "Sugrengine, London"
WORKS:
COOK STREET
GLASGOW C5



CENTRIFUGALS

Continuous operation on all grades of sugar—after-product, raw sugar, affination or whites—is brought to a new level of productive efficiency with this latest Pott, Cassels & Williamson design, one of the best all-round centrifugals available today.

This centrifugal incorporates a complete and fool-proof system of controls with adequate interlocks. It is intended for non-stop working without any operator in attendance, and has been fully tested with complete success.

A catalogue is now available; please write for your copy.

POTT, CASSELS & WILLIAMSON LTD.

MOTHERWELL, LANARKSHIRE, SCOTLAND.

Cables: Pott, Motherwell.

isothermic compression may be assumed, BOYLE's law applies as:

$$p_1 \times V_1 = p_2 \times V_2 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

where:

p_1 and V_1 = absolute air pressure and volume before compression.

p_2 and V_2 = absolute air pressure and volume after compression.

Assuming that both mill rams are allowed to lift 1 inch, the combined plungers will rise 22 inches.

The air plunger then displaces 4 Imp. gallons against an original air volume of 54 Imp. gallons.

The absolute air pressure increase thus will be:

$$(54—50) \ / \ 50 = 8\%$$

which has a corresponding effect on the oil pressure.

Both plungers of Fig. 3 are guided by a crosshead and moreover an oil seal has been applied on the air plunger.

By releasing, partially or totally, the air from the air vessel, the top roller of the mill will rise easily in the case of a mill choke. Re-loading by the air compressor will take some time, as a large storage tank is not practicable on account of the high pressure. So as to reduce the increase of air pressure when the plunger d_{11} rises, two adjacent air vessels have been arranged as shown in Fig 4.

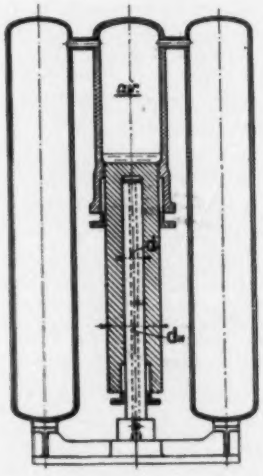


Fig. 4

Nevertheless the increased air volume does not reduce the required air pressure and since air is released to reduce the hydraulic load on the top roller of the mill, the compressor for re-charging must supply a bigger volume.

In 1937 a modified design, based on the same principle, was successfully introduced in Louisiana, the modification shown in Fig. 5 having a larger "n" ratio, e.g.:

for crushers $n = 16$.

for mills $n = 25$.

Assuming a hydraulic pressure of 3500 p.s.i.g. the corresponding air pressure will be 220 and 140 p.s.i.g. respectively and a light compressor for 225 p.s.i.g. air pressure, mounted on a steel storage tank, is used for a number of accumulators.

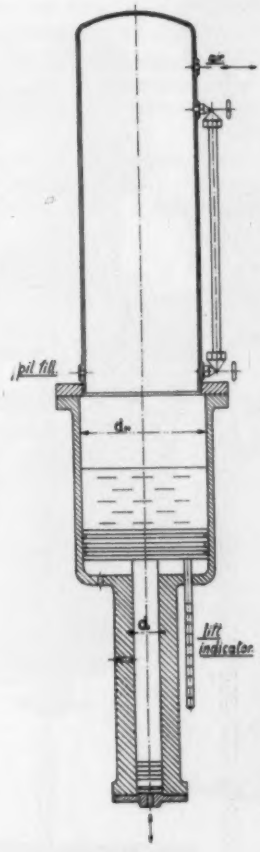


Fig. 5

Air releasing and recharging is done similarly to the method previously explained and the air volume above the large piston will decrease when sealing oil on top of the latter has been given more copiously.

With "r" ratios given as:

for crushers $r = 13{\cdot}5$

for mills $r = 21{\cdot}2$

the combined pistons of the accumulator for 1 inch lift of the crusher top roller, will rise 13·5 inches,

reducing the air volume from 77 to 62 Imp. gallons, which will cause a pressure increase of:

$$(77—62) / 62 = 24\%.$$

Apparently a greater hydraulic pressure is favoured by this design, when the bagasse blanket passing between the rollers, becomes thicker.

Prevention of excess pressure is easily obtained by providing a relief valve on the air cushion chamber.

The air piston of this H.P. accumulator has metallic piston rings, whereas the oil plunger has V-ring packing.

An indicating rod rises with the air piston and movements of same can be observed from outside.

Proceeding on the same hydro-pneumatic principle, the bladder type accumulator has found a wide application since its introduction in 1949 for cane mills in Louisiana.

In a heavy steel casing c as in Fig 6 is inserted a bladder of synthetic rubber, inflated with nitrogen through a check valve r at a usual pressure of 2500 p.s.i.g.

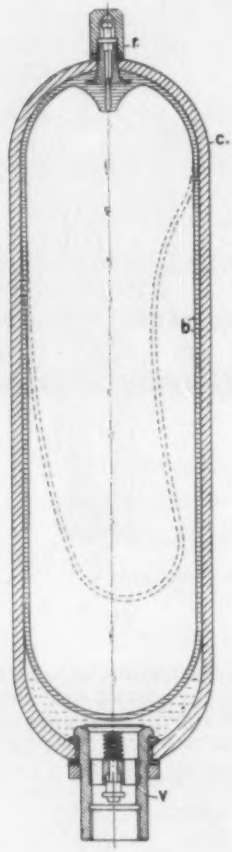


Fig. 6

So as not to press the bladder through the bottom connection, a retention valve V has been provided and before inflating the bladder, some oil is injected into the casing.

The largest size recommended by the manufacturers has a bladder capacity of 10 U.S. gallons and by pressing oil into the casing outside the bladder at, say, 3500 p.s.i.g. the bladder will be compressed to an uncertain shape as shown with dotted lines in the diagram.

The gas volume now will be reduced according to formula (6) and neglecting the small difference between absolute and gauge pressure, to 2500 / 3500 or 71·4% of the original volume, i.e. 7·14 gal. Being of relatively small size, each mill ram is provided with an individual bladder accumulator and assuming a lift of 1 inch on a 12 inch ram, the oil and the air displacement will be 0·49 U.S. gallons.

From this figure the pressure increase amounts to:

$$0·49 / (7·14 — 0·49) = 7·4\%$$

As this increase in pressure is very reasonable, mill chokes are largely avoided and the accumulator is a safety device when extreme roller lifts take place.

About the detorioration of the bladder during operation or during the off-season, no definite data are available, but so far the duration of same seems practically unlimited.

Maximum permissible pressures are given as 4200 p.s.i.g. for safe operation.

Contrarily to the previously described H.P. accumulators, for varying load on the top roller of the mill, not the nitrogen but the oil is released, and, as the oil fill is relatively small, a small high pressure pump of 36 U.S. g.p.m. and 6000 p.s.i.g. is furnished with the accumulators of a mill train.

(To be continued)

Sugar production in Colombia[1].—Sugar production in Colombia last year has been estimated at 255,000 metric tons, an increase of 13,000 tons over the previous out-turn, according to Reuter. New equipment is being installed in Colombia's largest sugar mill in the Cauca valley which is expected to increase its output by half. Also in the Cauca valley some 15,000 hectares is being prepared for cane cultivation and a new mill is to be constructed. It is anticipated that by 1961 production will be in the region of 340,000 tons.

* * *

U.S.S.R. sugar crop, 1959[2].—According to the Plan Discharge Report just published 41·4 million tons of sugar beet were harvested last autumn as against 51 million tons in 1958. Sugar production, however, at 6·667 million metric tons, raw value. is higher than the last crop which came to 6·333 million tons, Beet yield per hectare was 14·03 metric tons, considerably lower than the 20·46 tons in 1958, as would be expected because of the dry weather. Sugar extraction was, as expected, up from 12·41% to 16·10%. It is emphasized by F. O. LICHT that these figures are based on calendar years and not campaign years, and that no results of beet tests, etc. are available.

[1] C. Czarnikow Ltd., *Sugar Review*, 1960, (443), 34.
[2] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 3), 39.

Less personnel and higher capacity

by

fully automatic BMA - Centrifugals

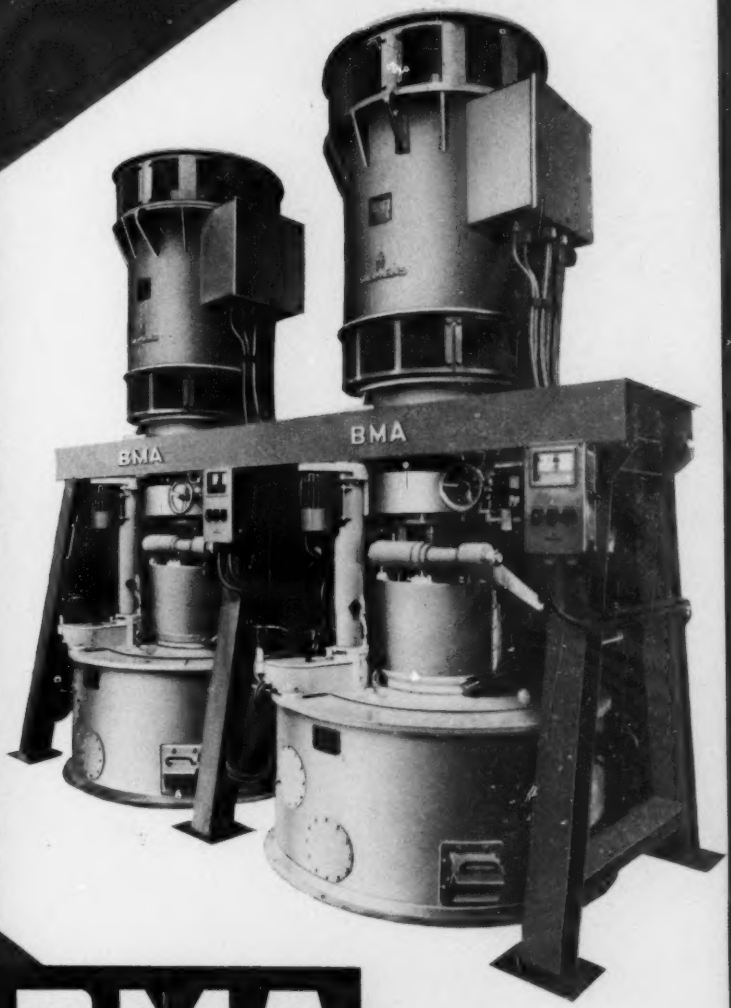
The fully automatic BMA-centrifugals are a matured and clear construction, reliable in operation and usable for all products.

- **Wage saving**
- **more uniform sugar quality**
- **energy saving**

are the decisive advantages.

The complete cycle including filling and discharging process is fully automatized in a simple manner.

Only one supervisor is required for the complete centrifugal plant of a sugar factory.

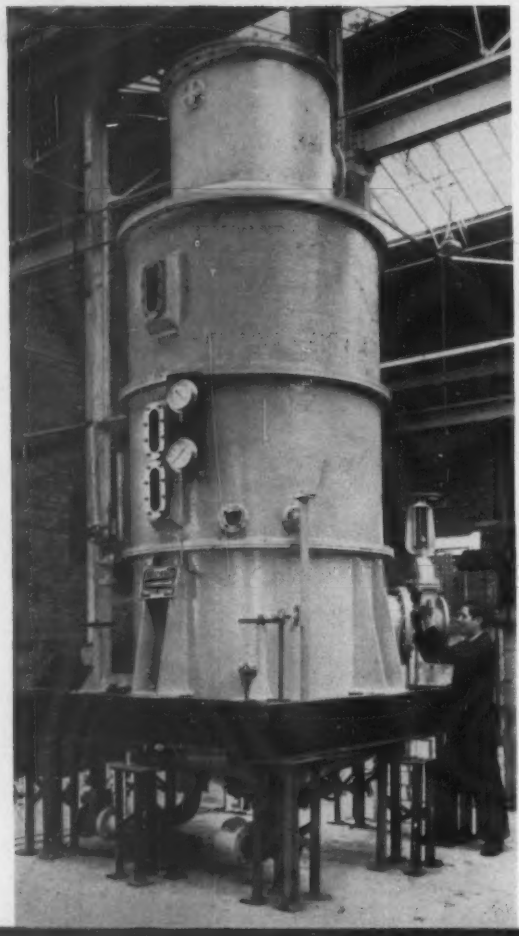


BMA

BRAUNSCHWEIGISCHE MASCHINENBAUANSTALT

BRAUNSCHWEIG / WESTERN GERMANY

Since more than 100 years complete factories for beet sugar, cane sugar, as well as plants for alcohol, yeast, gases, starches and edible oils



Evaporators by

*CRAIG

*** manufacturers of machinery for Complete Sugar Factories**

The vacuum pans illustrated are part of the machinery supplied by CRAIG for this sugar factory in India.

Your enquiries will have our prompt attention.

A. F. CRAIG & COMPANY LIMITED

Head Office and Works: Caledonia Engineering Works, PAISLEY, SCOTLAND
Telephone: Paisley 2191 Telegrams: Craig, Paisley

London Office: 727 Salisbury House, London Wall, E.C.2 Telephone: National 3964

APPARATUS FOR COUNTER-CURRENT EXTRACTION IN THE LABORATORY

By C. J. ASSELBERGS, J. F. HENGEVELD, P. W. VAN DER POEL and H. I. WATERMAN
with the collaboration of H. W. SAEYS and H. K. KROEZE.

Summary

THE construction of an apparatus for counter-current extraction on a laboratory scale is described. The equipment was designed for the extraction of sucrose from sugar beets or cane.

Introduction

The apparatus described in this article was built in addition to a counter-current extraction battery, described in an earlier paper[1]. The disadvantage of this battery was that it demands a large quantity of raw material; 1 to 2 tons per 24 hours. For the study of the extraction of sucrose from sugar cane this is an objection in regard to the small quantity of fresh sugar cane which is available in the non-tropical climates. Another factor against the use of the diffusion battery is the necessity for three operators. Continuously working extraction equipment for the laboratory exists in various forms. Their use is less complicated than that of a battery. These apparatuses, however, are usually scaled down from industrial equipment, which brings several disadvantages. The scaling-down usually results in an increase of the divergence in the retention time and the mechanical damage to the vegetable tissue becomes more serious. Mechanical damage results in an increase of the amount of impurities in the extract. More divergence in the retention time confuses the picture concerning the progress of the extraction.

It is believed that the new apparatus lacks those drawbacks. Mechanical damage of the cossettes is absent. The retention time is the same for all the cossettes and may be chosen at will.

There are no valves to be handled and one person can run the unit.

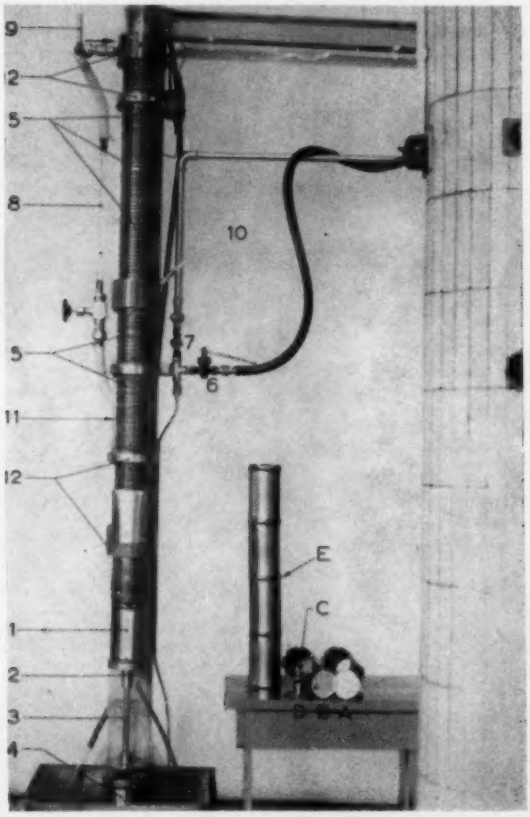


Fig. 1. Photograph of the apparatus for countercurrent extraction in the laboratory.

(1) Cup with fresh cossettes, (2) drain for the extract, (3) piston rod, (4) power cylinder, (5) vent holes, (6) vacuum valve, (7) pressure valve, (8) flow meter, (9) thermometer in the extraction liquid, (10) thermometer in the column, (11) heating wire, (12) stiffening rings. (A) Bottom, (B) perforated false bottom, (C) uptake, (D) perforated plate to prevent the cossettes from floating up, (E) rubber O-ring.

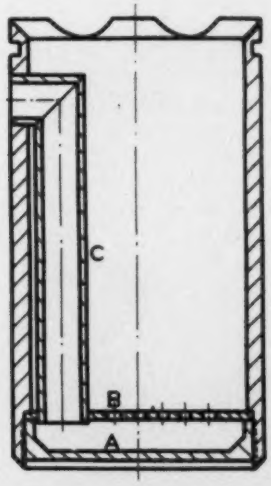


Fig. 2. Section of a cup.

Construction of the apparatus

The outstanding feature of the apparatus is that the solid material which is to be extracted is

[1] BOON *et. al.*: *Chimie et Industrie*, 1951, **65**, 488.

transported in a stack of cups through a vertical column. The movement of the cups is stepwise. The liquid flow through the apparatus is continuous and its direction is contrary to the direction of the transportation of the cups. The fluid flows down by gravitation. The cups move upwards. These features determine the set-up of the equipment (Fig. 1). The design of the cups is shown in Fig. 2. The cups are provided with a perforated false bottom. The juice entering the cups across the upper edges leaves them by means of the uptake. By this construction it is assured that the cups stay filled with juice up to the

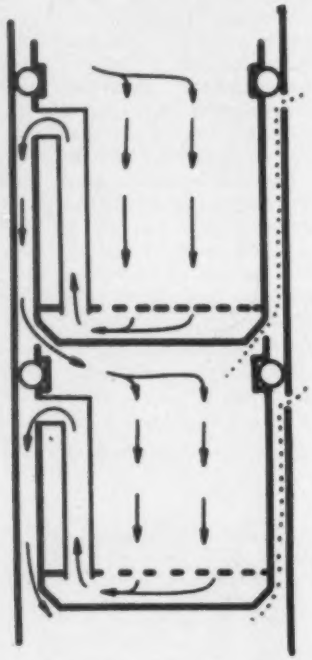


Fig. 3. Flow system in the stack of cups.
——— liquid.
. . . . . air.

working level. An O-ring is situated between the upper edge of a cup and the discharge hole. These O-rings force the downcoming juice to follow a path through the next lower cup of the stack as the narrow space between the wall of the column and the cups is sealed by means of the O-rings (Fig. 3). The lower and upper edges of the cups are conical and fit together. In this equipment the friction between the O-rings and the wall of the column is sufficient to prevent the sliding down of the cups. Periodically a cup filled with fresh cossettes is placed inside the base of the column. In order to obtain a regular flow of the extract through the whole apparatus, variations in pressure should be eliminated, to prevent siphoning. Next to every cup a small hole in the wall of the column provides a connection with the atmosphere. The place of these holes has been chosen in such a way that losses of juice by leakage are prevented. The juice is led through flutes which have been milled in the walls of the cups. Succeeding cups are placed in the column with their discharge holes alternatively to the right and left. The holes in the wall of the column are situated just below the O-rings. Through the first hole near the base of the column air escapes during the filling of the cup with juice. 50% of the volume of the cup is taken up by the beet cossettes. After the newly-inserted cup has been filled with juice, extract can be taken from the column. After the withdrawal of an amount of juice which is determined by the chosen draft another cup of fresh cossettes can be placed in the column. The cups in the stack are raised to the next higher position at the same time.

The material of the cups is bronze. The wall of the column is a brass tube. The stack comprises eleven cups. An additional cup is available for emptying and filling. The column wall is heated electrically and the temperature during the extraction can be chosen between ambient and 90°C. Whenever the extraction takes place at temperatures above 50°C preheating of the cups is desirable. The extract obtains the desired temperature by heat exchange with the column wall. The extract (juice) in its turn heats the cossettes.

Results

The extraction in the new apparatus is demonstrated by means of a couple of experiments.

(1) Cold extraction of chloroform-killed sugar beet cossettes[1].

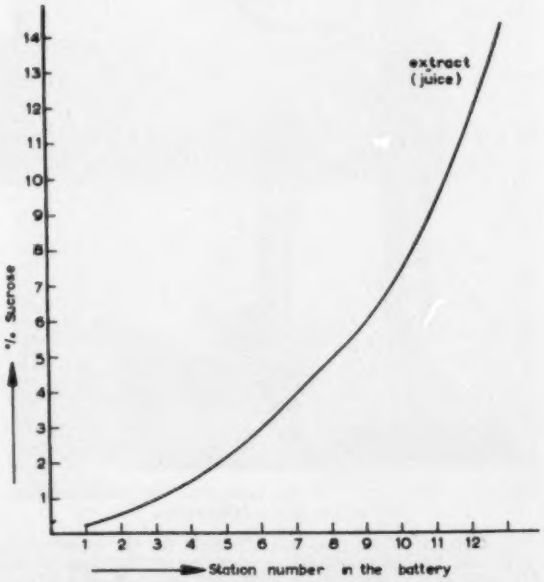


Fig. 4. Sucrose content of the extract and of the cossettes as a function of station number. Cold extraction.

[1] WATERMAN *et al.*: *Sugar y Azúcar*, 1958, **53**, (5), 29.

Nurnberg

Another Hamill Pan order receives attention.

DUNCAN STEWART & COMPANY LIMITED, Park Gate, Glasgow

N.12

Suchar ACTIVATED CARBON

effectively eliminates color, taste and odor from sugar

Specifically developed for the cane sugar industry, SUCHAR activated carbon is the best way to remove colors, odors and flavors from sugar liquors.

Amazing surface area and porosity make it the most efficient carbon you can use. And since *less* SUCHAR can treat *more* sugar, it's economical, too. Actually cuts your carbon costs by 10% or more.

For many years, SUCHAR has helped the cane sugar industry produce better sugar with activated carbon, Auto and FAS-FLO* Filters and expert engineering service. We'll be pleased to help you. As a start, let us quote on your requirements.

*Reg. TM of FAS-FLO Filter Corporation, New York

SUCHAR SALES CORPORATION

CONSULTING ENGINEERS

76 Beaver Street
New York 5, N. Y.

Cable Address: "SUCHARING" N.Y.

EXCLUSIVE DISTRIBUTORS OF SUCHAR ACTIVATED CARBON FOR THE CANE SUGAR INDUSTRY

The conditions during the extraction were as follows:

Silin number of the cossettes	22 m/100 g
draft	110%
temperature	20°C
extraction time	80 minutes

The course of the extraction is represented by Fig. 4.

(2) Hot extraction of sugar beet cossettes.

Silin number of the cossettes	22 m/100 g
draft	110%
temperature	72°C
extraction time	80 minutes

The course of the extraction is represented by Fig. 5.

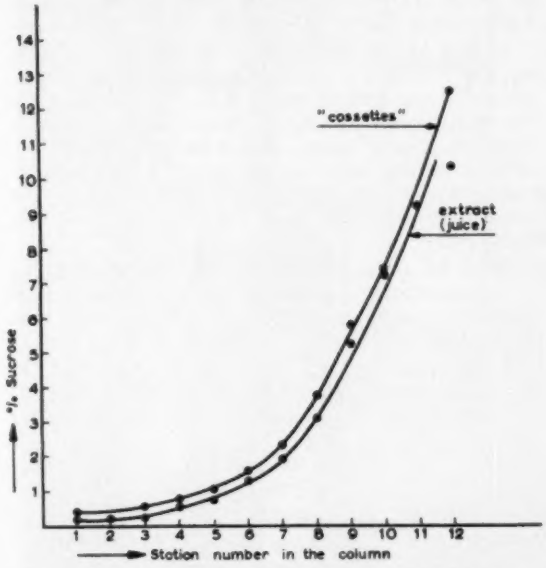


Fig. 5. Sucrose content of the extract and of the cossettes as a function of station number. Hot extraction.

Fig. 6 is given for comparison; in this, the sucrose content of the extract in an industrial extraction battery has been given as a function of the number of the vessel in the chain of the extraction battery.

In Figs. 4 and 5 the sucrose content of the extracts and cossettes have been plotted as a function of their place in the column (number of the cup).

After reaching states of equilibrium the water supply is stopped. The cups are removed from the column as quick as possible. Immediately afterwards the cossettes and the extract are separated to prevent further leaching of the cossettes. In the extracts and cossettes the sucrose contents are determined. Taking of a sample offers no difficulties as the whole content of a cup is necessary for one sample. To prevent irregularities in the extraction curves, the cossettes should be homogenized before the extraction.

Conclusion

From Figs. 5 and 6 it appears that the extraction in the equipment described in this article is analogous to the extraction in industrial extraction batteries. The difficulties in scaling-down of diffusion apparatus have been overcome. The apparatus can be helpful in determining the optimal conditions for the extraction plant.

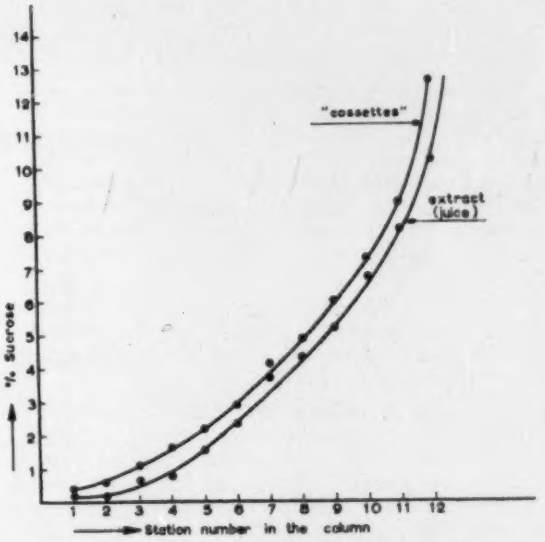


Fig. 6. Sucrose content of the juice in an industrial extraction battery.

Acknowledgments

The authors render their sincere thanks to Prof. Ir. E. F. BOON and Dr. Ir. M. L. A. VERHAART for their stimulating interest in this research. Two of the authors, C. J. ASSELBERGS and P. W. VAN DER POEL, thank the management of the N.V. Centrale Suiker Maatschappij for the opportunity to carry out this research under the supervision of Professor WATERMAN.

Belgian sugar factory for the U.S.S.R.[1]—The Soviet Union has placed an order with a Belgian firm, Ateliers Réunis, for the supply of a complete sugar factory with a daily capacity of 5000 tons of beet, at a cost of 575 m Belgian francs. It is to be delivered within the next two years.

* * *

Iran sugar plans[2].—A modern cane sugar factory and refinery is to be erected in Khuzestan by Dutch firms who will also supply the pumping machinery to be used for irrigating 10,000 hectares with water from the river Dez. The processing capacity of the factory will be 3000 tons of cane per day at first to be later increased to 6000 tons. It is hoped to start production late in 1962. S. A. "Shekar" has placed an order with Salzgitter Industriebau G.m.b.H. for the erection of a new sugar refinery at Garnsar, near Teheran, with a daily melt capacity of 100 tons of sugar.

[1] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 3), 39.

[2] F. O. LICHT, *International Sugar Report*, 1960, **92**, (1), 9.

INDIAN BAGASSE PAPER FACTORY

Constructional work has started in Mysore on a £2,250,000 integrated pulp and paper mill with an initial capacity of 35 tons per day of high grade writing and printing papers produced from sugar cane bagasse pulp. Production is expected to start in 1961.

The business concerns behind the announcement are the Parsons & Whittemore/Lyddon Organisation of New York, London and Paris, and Bedi & Company (Private) Ltd. of Bangalore. The new mill will be known as Mandya National Paper Mills, Ltd.

Technical services including supervision of construction and initial operation are being performed by the Parsons & Whittemore/Lyddon Organisation. Bedi & Company and Parsons & Whittemore will act jointly as managing agents. Parsons & Whittemore is also supplying the complete package of production machinery, orders for which have been placed with equipment manufacturers in France and the United States.

Financing of the mill has been obtained with the help of credits granted by the French Government to India and with the assistance of the Industrial Finance Corporation of India.

The Parsons & Whittemore/Lyddon Organisation, drawing upon its extensive experience in supplying complete mills to the international pulp and paper industry, will furnish Mandya an integrated plant which will be self sustaining except for electric power and some chemicals obtainable locally at favourable rates. Abundant quantities of sugar cane bagasse, the primary raw material, will be made available by Mysore Sugar Company Ltd., located near the paper mill site at Belagula between the cities of Bangalore and Mysore.

The bagasse pulp mill will employ a combination of moist depithing at the sugar mill and wet depithing at the pulp mill for elimination of all dirt and non-fibrous material from the raw bagasse. This treatment, carried into commercial operations by Parsons & Whittemore in other sugar producing areas, yields an easily bleachable fibre suitable for the manufacture of the highest quality white papers. The pulping operation will be conducted in a Black-Clawson Pandia continuous digester in accordance with techniques applied by Parsons & Whittemore to the pulping of a wide variety of agricultural fibres.

A 138-inch wide fourdrinier paper machine and all auxiliary paper-making equipment, as well as a liquor burning and chemical recovery system, will be supplied.

The Mandya mill will produce substantial quantities of writing and printing papers for the Indian market. At present, the annual per capita consumption of all papers in India is only 2 pounds as against 420 pounds in the United States. Literacy is on the rise, and industrialisation is spreading rapidly. These factors create an almost limitless opportunity for expansion of pulp and paper manufacture.

Major markets for Mandya papers already exist within a 100 mile radius of the mill. The project plans have made allowance for ready expansion of the mill to meet an expected rising demand for its output.

Correspondence

THE EDITOR,
The International Sugar Journal Ltd.

Dear Sir,

You have published an excellent series of articles by Mr. W. H. Parker, Chief Chemist of British Sugar Corporation Ltd.

In one article (*International Sugar Journal*, 1959, **61**, 231) mention is made of a semi-automatic polarimeter having been tested by B.S.C. This instrument was in fact made by Hilger & Watts, and had reached the semi-automatic stage when it was loaned to B.S.C. at their request, due to their desire to test such an instrument during the 1957-58 beet campaign. In passing, it should be said that the tests were very satisfactory.

With the object of avoiding any misunderstanding it should be made clear that a fully automatic version followed in 1958 and that this automatic model is in full production.

I have discussed the above with Mr. Parker and he has gladly agreed to my sending this note to you as an amplification of a small detail in this particular article.

Yours sincerely,

G. E. FISHTER,

Head of Process Instruments Department
Hilger & Watts Ltd.

98 St. Pancras Way,
Camden Road,
London N.W.1.

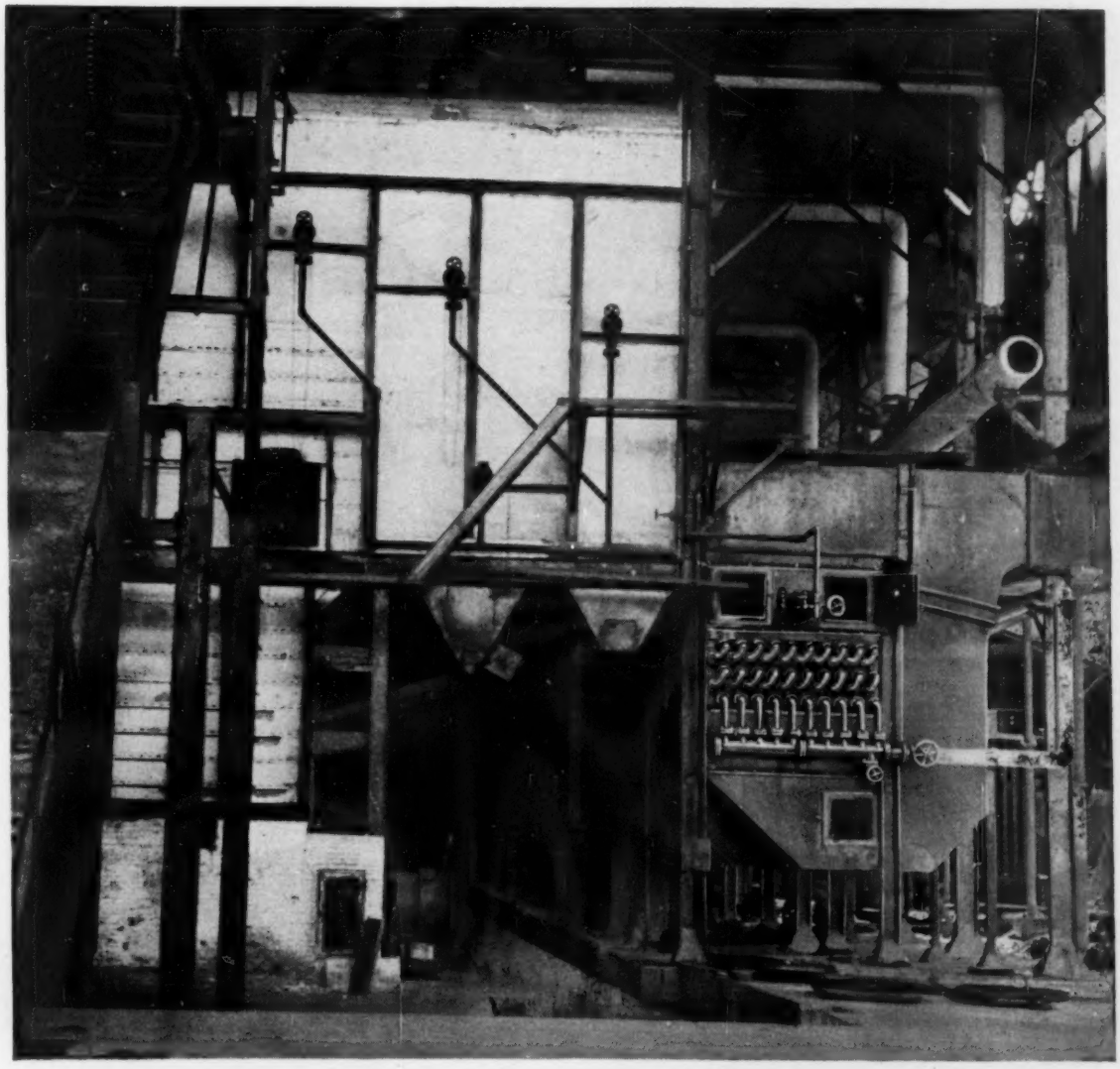
Sugar production in Burma[1].—The three government-owned sugar factories in Burma produced 38,348 tons of sugar in 1958/59, 1588 tons less than in the previous season. Originally production had been estimated at 43,000 tons and, since consumption is about 45,000 tons, the difference of 6600 tons will have to be imported.

* * *

British Guiana sugar production in 1959[2].—The sugar crop of 1959 totalled 284,425 tons against the record crop of 306,361 tons in the previous year. The decrease in production was largely due to adverse weather conditions. Of the 1959 crop, 255,154 tons were exported and local consumption accounted for 19,133 tons. Provisional estimates place the 1960 crop at approximately 305,000 tons of sugar.

[1] F. O. LICHT, *International Sugar Report*, 1960, **92**, (1), 8.
[2] *Overseas Review* (Barclays D.C.O.), February 1960, p. 81.

More steam with a GREEN'S ECONOMISER



E. GREEN & SON LTD · WAKEFIELD

Makers of economisers for more than one hundred years.

If you are pressed for more steam (or find the need to save supplementary fuel) a Green's Economiser installation can assist at a cost which shows a handsome dividend on the outlay.

Installed at Nicaragua Sugar Estates Ltd.

GE 192

INDIAN BAGASSE PAPER FACTORY

Constructional work has started in Mysore on a £2,250,000 integrated pulp and paper mill with an initial capacity of 35 tons per day of high grade writing and printing papers produced from sugar cane bagasse pulp. Production is expected to start in 1961.

The business concerns behind the announcement are the Parsons & Whittemore/Lyddon Organisation of New York, London and Paris, and Bedi & Company (Private) Ltd. of Bangalore. The new mill will be known as Mandya National Paper Mills, Ltd.

Technical services including supervision of construction and initial operation are being performed by the Parsons & Whittemore/Lyddon Organisation. Bedi & Company and Parsons & Whittemore will act jointly as managing agents. Parsons & Whittemore is also supplying the complete package of production machinery, orders for which have been placed with equipment manufacturers in France and the United States.

Financing of the mill has been obtained with the help of credits granted by the French Government to India and with the assistance of the Industrial Finance Corporation of India.

The Parsons & Whittemore/Lyddon Organisation, drawing upon its extensive experience in supplying complete mills to the international pulp and paper industry, will furnish Mandya an integrated plant which will be self sustaining except for electric power and some chemicals obtainable locally at favourable rates. Abundant quantities of sugar cane bagasse, the primary raw material, will be made available by Mysore Sugar Company Ltd., located near the paper mill site at Belagula between the cities of Bangalore and Mysore.

The bagasse pulp mill will employ a combination of moist depithing at the sugar mill and wet depithing at the pulp mill for elimination of all dirt and non-fibrous material from the raw bagasse. This treatment, carried into commercial operations by Parsons & Whittemore in other sugar producing areas, yields an easily bleachable fibre suitable for the manufacture of the highest quality white papers. The pulping operation will be conducted in a Black-Clawson Pandia continuous digester in accordance with techniques applied by Parsons & Whittemore to the pulping of a wide variety of agricultural fibres.

A 138-inch wide fourdrinier paper machine and all auxiliary paper-making equipment, as well as a liquor burning and chemical recovery system, will be supplied.

The Mandya mill will produce substantial quantities of writing and printing papers for the Indian market. At present, the annual per capita consumption of all papers in India is only 2 pounds as against 420 pounds in the United States. Literacy is on the rise, and industrialisation is spreading rapidly. These factors create an almost limitless opportunity for expansion of pulp and paper manufacture.

Major markets for Mandya papers already exist within a 100 mile radius of the mill. The project plans have made allowance for ready expansion of the mill to meet an expected rising demand for its output.

Correspondence

THE EDITOR,
The International Sugar Journal Ltd.

Dear Sir,

You have published an excellent series of articles by Mr. W. H. Parker, Chief Chemist of British Sugar Corporation Ltd.

In one article (*International Sugar Journal*, 1959, **61**, 231) mention is made of a semi-automatic polarimeter having been tested by B.S.C. This instrument was in fact made by Hilger & Watts, and had reached the semi-automatic stage when it was loaned to B.S.C. at their request, due to their desire to test such an instrument during the 1957-58 beet campaign. In passing, it should be said that the tests were very satisfactory.

With the object of avoiding any misunderstanding it should be made clear that a fully automatic version followed in 1958 and that this automatic model is in full production.

I have discussed the above with Mr. Parker and he has gladly agreed to my sending this note to you as an amplification of a small detail in this particular article.

Yours sincerely,

G. E. FISHTER,

Head of Process Instruments Department
Hilger & Watts Ltd.

98 St. Pancras Way,
Camden Road,
London N.W.1.

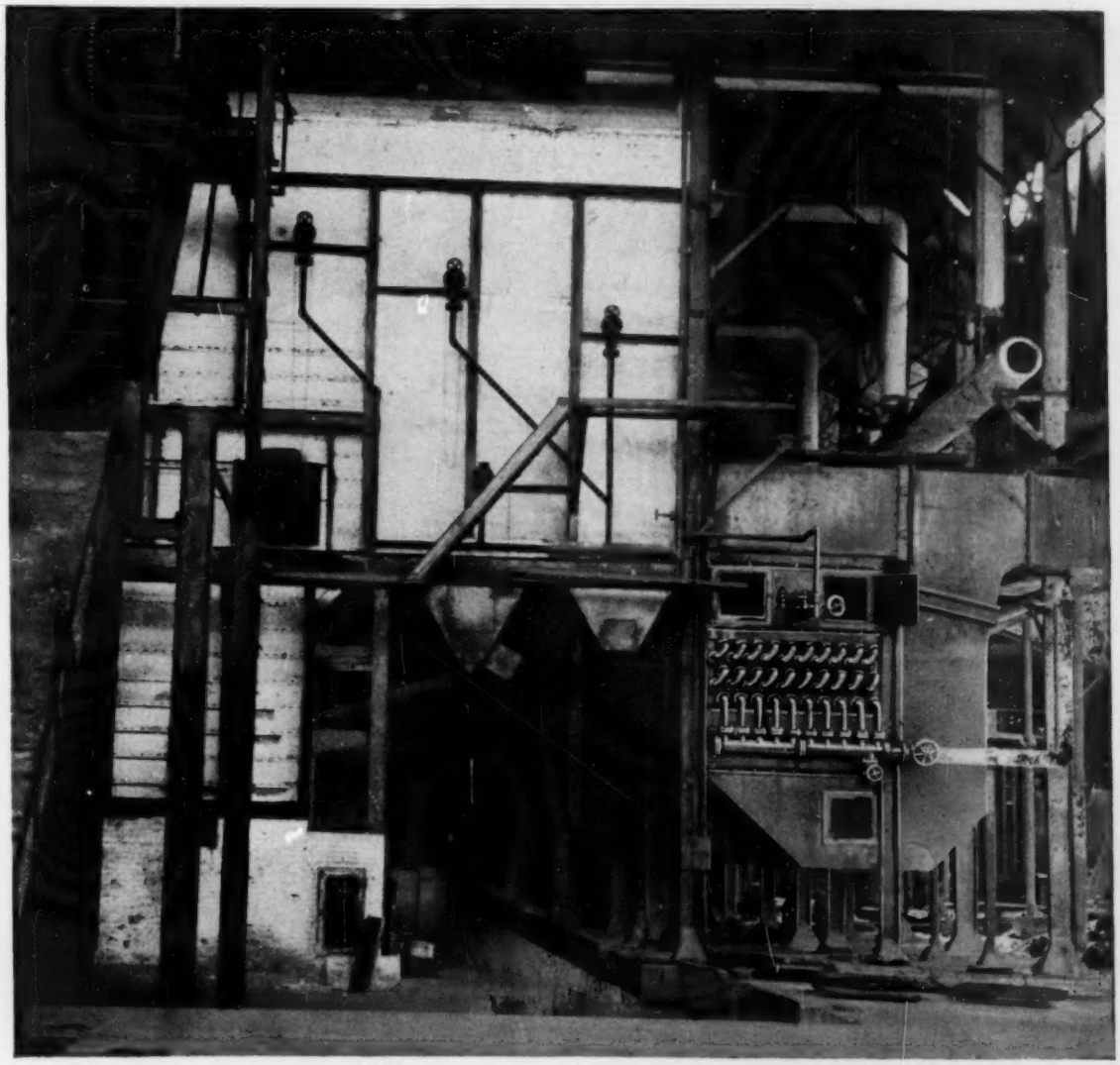
Sugar production in Burma[1].—The three government-owned sugar factories in Burma produced 38,348 tons of sugar in 1958/59, 1588 tons less than in the previous season. Originally production had been estimated at 43,000 tons and, since consumption is about 45,000 tons, the difference of 6600 tons will have to be imported.

* * *

British Guiana sugar production in 1959[2].—The sugar crop of 1959 totalled 284,425 tons against the record crop of 306,361 tons in the previous year. The decrease in production was largely due to adverse weather conditions. Of the 1959 crop, 255,154 tons were exported and local consumption accounted for 19,133 tons. Provisional estimates place the 1960 crop at approximately 305,000 tons of sugar.

[1] F. O. LICHT, *International Sugar Report*, 1960, **92**, (1), 8.
[2] *Overseas Review* (Barclays D.C.O.), February 1960, p. 81.

More steam with a GREEN'S ECONOMISER



E. GREEN & SON LTD · WAKEFIELD

Makers of economisers for more than one hundred years.

If you are pressed for more steam (or find the need to save supplementary fuel) a Green's Economiser installation can assist at a cost which shows a handsome dividend on the outlay.

Installed at Nicaragua Sugar Estates Ltd.

GE 192

150 BAGS OF GRANULATED SUGAR *packed per minute!*

with the TITESEAL *packaging machine*

The "TITESEAL" is the most advanced granulated sugar packaging machine in the world and incorporates the following features :—

Packaging speed adjustable between 100 and 150 bags per minute.

Both 1-lb and 2-lb or 0.5 Kilo and 1.0 Kilo can be packed on one machine.

All working parts are above the sugar line thus avoiding any damage to the mechanism from spillage and burst bags.

Mechanism fully protected with automatic cut-out switches wired to a central panel to show immediately the point of stoppage.

The two bag filling mechanisms work independently and either can be shut down for maintenance and the machine run at half speed.

Weighing machines guaranteed to an accuracy of plus and minus 1 gram.

Operates with pre-made block bottom, gusseted, S.O.S. bags, giving a square, well-finished pack with sift-proof seal.

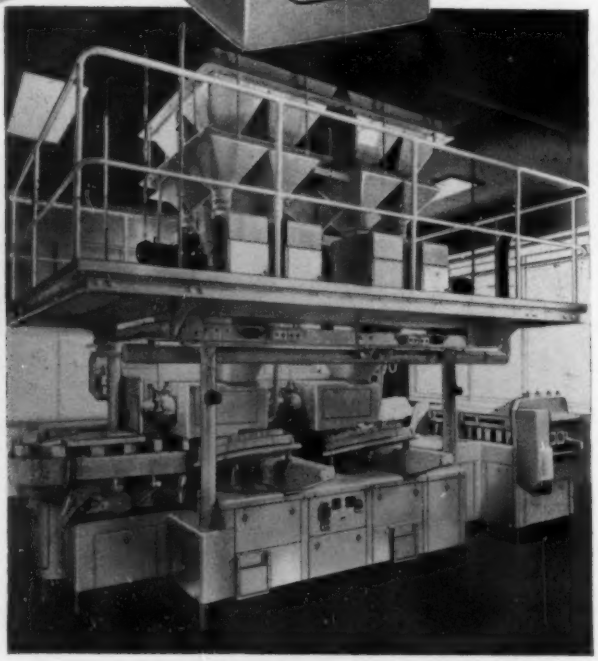
Fitted with centralised lubrication system.

Sealed packs delivered in lines of four for ease of parcelling.

All parts manufactured from precision tools and jigs.

The "TITESEAL" machine only requires one operator whose duties are to keep the bag magazines filled and generally to supervise.

Covered by a comprehensive guarantee for 12 months.



For refineries requiring a smaller capacity machine we manufacture the "SEALTITE" machine which will pack from 1-lb to 2-Kilo weights at speeds up to 50 packs per minute in S.O.S. bags with the same weighing accuracy as the Titeseal.

Full details of either machine will gladly be sent upon request.

Manufacturers

BRECKNELL, DOLMAN & ROGERS, LTD.

PENNYWELL ROAD BRISTOL ENGLAND

TELEPHONE: BRISTOL 58222 TELEGRAMS: BREMANERS BRISTOL

Continuous sugar melter. L. HEGEDÜS. *Cukoripar* 1959, **12**, 147–148; through *S.I.A.*, 1959, **21**, Abs. 569.—A steam-jacketed melter, 8 m long with a catenary-curved base and a cross-arm stirrer, constructed at Szolnok factory, is described. Steam is injected at several places as sugar is introduced.

* * *

Bulk handling in the Dominican Republic. New Rio Haina facility in operation. ANON. *Sugar y Azúcar*, 1959, **54**, (9), 32–33.—An illustrated description is given of the raw sugar bulk storage and ship loading facilities at Rio Haina[1].

* * *

Operation of a 150-ton "Suchar" process refinery. L. CIFRA. *Sugar News* (Philippines), 1959, **35**, 322–326, 345.—The Insular sugar refinery processes local raws, which are affined, melted to 60°Bx and treated with lime and phosphoric acid, by the Williamson process, and the clear liquor passed through "Autofilters" after being mixed with 2¼% "Suchar" activated vegetable carbon. The fine liquor is boiled to a refined sugar, the first product run-off being reboiled to a raw after mixing with the affination run-off. An account is given of the equipment used in the refinery processes as well as ancilliaries such as boilers, power house, etc.

* * *

Clarification of juice. The "Alrubar" process. A. RUBIO BARÓ. *Bol. Ofic. A.T.A.C.*, 1959, **18**, 535–537.—Mixed juice from the mills is passed in the cold through a collector to remove the bagacillo, brought to pH 3·5 with phosphoric acid and immediately limed to pH 7·3–7·5; flocculation of the colloids is immediate. These are removed mechanically by means of 48 × 24 inch solid-basket centrifugals operating at 1200 r.p.m. The juice is then heated to 215–220°F and goes to the evaporator and further processing. The process increases purity by 3 units, e.g. from 82 to 85, and inversion (which normally takes place in the evaporators) is prevented. Coloured and other impurities are not taken into solution, and the mud from the centrifugal is so dense that it has to be mixed with water before it can pass to the filters—the sucrose in mud is thus reduced readily to 0·5%, so permitting higher recovery.

* * *

Exchange capacity and flocculating activity of adsorbents in sugar cane juices. M. C. BENNETT. *Chem. and Ind.*, 1959, 1380–1381.—The flocculating activity of a number of adsorbents was measured by determining the decrease in turbidity on centrifuging 100-ml samples of raw juice, to which they had been added, at 1000 *g* for 5 min, the pH being adjusted to 5·0 with HCl or KOH. Turbidity was measured by determining the optical density at 650 mμ of the juice diluted with acetate buffer of pH 4·6, a colour correction being found by measuring this after all turbidity had been removed by means of a large amount of adsorbent. The results are plotted in graph form and show linear portions where % particles removed is related linearly to the amount of adsorbent present, reaching levels where further adsorbent afforded no further removal. Activity of the adsorbents decreased with decreasing base exchange capacity, bentonite, for example, being much more active than fuller's earth, and it was also shown that, for any bentonite or fuller's earth sample, the activity was directly related to its exchange capacity for calcium. The relationship found was not, however, generally applicable to the range of adsorbents studied.

* * *

How to make classic-type centrifugals automatic at lowest cost. R. LEPOUTRE. *Sucr. Franç.*, 1959, **100**, 266–271.—Automatic operation of standard centrifugals is discussed with reference to the three phases of their operation. Discharging without an operator requires the use of the mechanism patented recently[2], and also for the plough to be trapezoidally shaped to match the shape of the top and bottom of the basket casing. Charging of the massecuite is as according to another patent technique[3], while the method of obtaining low speeds for charging and discharging reducing energy losses, etc., is to use a cheap hydraulic motor mounted above the electric motor and used in conjunction with it. The motor serves as a volumetric pump during deceleration, delivering oil to an accumulator and so conserving the braking energy which is restored when the basket is accelerated. The operations are controlled by a cyclic commutator comprising a battery of Telemécanique contactors, speeds being measured by a small tachometric dynamo in the case of A.C. and by the motor itself in the case of D.C. By use of the apparatus, operating personnel are eliminated while maintenance personnel are unchanged. The number of machines in refinery service is halved, and current consumption is reduced from 11 to 4 kWh/ton of sugar.

* * *

Extraction of Philippine sugar factories. D. SUERTE. *Sugar News* (Philippines), 1959, **35**, 449–452.—From the Deerr formulae for primary and secondary extractions, corresponding to dry and wet (imbibition) mills of a tandem, it is deduced that if the imbibition water % cane is in a constant proportion to the fibre %

[1] *See I.S.J.*, 1959, **61**, 351.
[2] *I.S.J.*, 1959, **61**, 380.
[3] *I.S.J.*, 1960, **62**, 76.

cane, then extraction is independent of the latter. The importance of the initial "dry" extraction on total extraction is emphasized. A survey of milling performances of Philippine factories shows that efficiency is satisfactory despite low imbibition water in about half. The ratio 100-mixed juice purity:100-absolute juice purity is proposed as a possible guide to milling efficiency.

* * *

A-molasses graining vs. syrup graining—a theoretical appraisal under Victorias conditions. J. P. STO. DOMINGO. *Sugar News* (Philippines), 1959, **35**, 454–467.—Detailed comparative qualities, purities, etc., are calculated and tabulated for a factory such as Victorias Milling Co., crushing 5200 tons of cane per day, all other features being the same, except that the C-massecuites are grained on syrup and A-molasses respectively. It is observed that there is 10% more A-massecuite (producing 72% of total sugars in place of 65%) and 24% less B-massecuite in the system of A-molasses graining, while total A + B-massecuites is 2% less. More sugar from higher purity massecuites generally means greater pan capacities and sugar of better refining quality.

* * *

Modern conveying installation for raw sugar in the West Indies. ANON. *Sugar News* (Philippines), 1959, **35**, 476–478.—An illustrated description is given of the bulk loading installation at Rio Haina, Dominican Republic[1].

* * *

The pre-clarification of cane juice. J. R. DE LA VEGA. *Inst. Cubano de Investigaciones Tecnól., Serie de Estudios sobre Trabajos de Investigación*, 1957, (1), 54 pp.—See *I.S.J.*, 1959, **61**, 209.

* * *

Study of a new system of clarification of cane juice by indirect alkalization. M. LIMA GUTIERREZ. *Bol. Azucar. Mexicano*, 1958, (Sept.), 32–33; through *S.I.A.*, 1959, **21**, Abs.600.—Laboratory tests have been made of the treatment of cane juice with an anion-exchange resin in order to remove sulphate from $CaSO_4$, yielding $Ca(OH)_2$, and prevent scaling of the evaporator calandria. Improved clarification, juice purity and evaporator operation are claimed.

* * *

Design of pans. F. SERNA SILVA. *Bol. Azucar. Mexicano*, 1958, (Sept.), 28–30; through *S.I.A.*, 1959, **21**, Abs. 705.—The design and calculation of pans, their heating coils and condensers are considered. Some results obtained with new installations in Mexico are discussed.

* * *

Some views on sugar centrifuging. I. BAZAN BARLIA. *Bol. Azucar. Mexicano*, 1958, (Sept.), 24–27; through *S.I.A.*, 1959, **21**, Abs.707.—Principles of sugar centrifuging in the cane sugar factory and refinery are outlined. Basket dimensions, number of revolutions, etc., of centrifugals for first and second massecuites are compared with those for third massecuites.

Plane-glass mirror solar energy concentrators for concentrating sugar-cane and palm juices. M. L. KHANNA, A. L. GARDNER, T. N. DAVEY and S. P. SURI. *J. Sci. Industr. Res.*, 1959, **18A**, 212–217; through *J. Sci. Food Agric. Abs.*, 1959, **10**, ii–227.—The concentrators consist of 16 or more small plane-glass mirrors fixed on a wooden frame so that together they approximate to a curved surface. Several concentrators are placed so that they reflect and focus the sun's rays at the same point. As the sun moves, the reflectors are adjusted by hand. Temperatures >400°C have been obtained, and satisfactory evaporation of water and sugar-cane juice is reported, at an average efficiency of 45–50%. The economics of using this process in the sugar-cane and palm gur industries is discussed.

* * *

Sucrose decomposition during the milling of cane. K. DOUWES DEKKER. *S. African Sugar J.*, 1959, **43**, 879–889.—The literature on bacterial losses during milling is surveyed and the four methods of calculating these losses are discussed. That chosen is to determine the drop in sucrose content of juice samples and from this measured rate and the retention time and juice concentration in the mills to calculate the losses. Bacterial counts in juice samples from various mills in Natal are tabulated. Comparable data of sucrose and reducing sugar concentrations, pH and micro-organisms count as a function of time from sampling are presented in graph form and show that the main reaction during a not-too-protracted period is inversion. Later, decomposition of reducing sugars occurs. The pH drops slowly during the first 2 hr but more rapidly thereafter. For a juice-bagasse mixture the rate of sucrose loss was 200–1500 mg/litre over 30 min at 15% concentration, and, assuming the sucrose extraction of each mill unit to be 60% and retention of juice-bagasse mixture between units and of juice in the pipeline to be 2 min, and retention time on the scales, in the tanks and pumps to the heaters to be 6 min, the loss in milling will be 0·03%–0·26%, i.e. smaller than the loss between the tandem and heaters. This latter loss depends on the juice contamination and it is recommended that the retention time be cut to a minimum and that the mills be frequently cleaned. Examination of the effect of an organo-chlorine compound "Sterichlor 4X" showed that at 60 mg/litre it halved the rate of inversion.

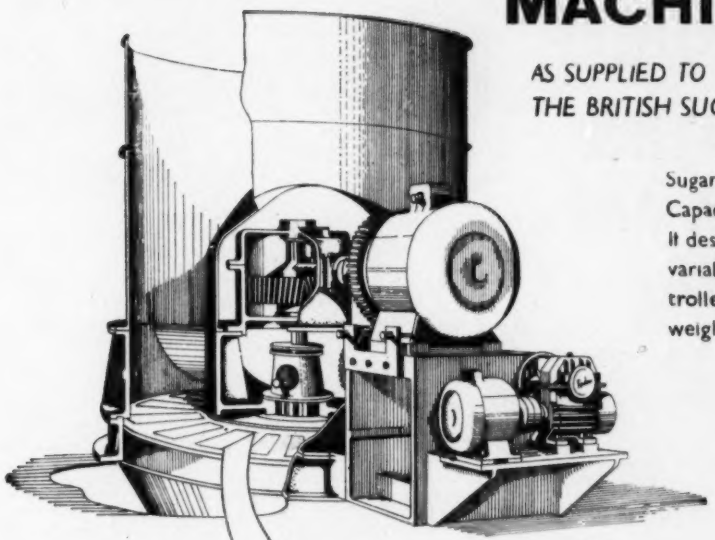
* * *

The loss of sucrose in cut cane. K. DOUWES DEKKER. *S. African Sugar J.*, 1959, **43**, 889.—Attention is drawn to work by H. M. TYSDAL[2], indicating that the loss may reach 48% of the sucrose content of some varieties in 14 days and a loss of 12% in 9 days for N:Co 310. A loss of 1% per day corresponds to £3 10s per acre for cane left for five days, assuming 35 tons/acre yield and a cane price of £2 per ton.

[1] *I.S.J.*, 1959, **61**, 351.
[2] *Sugar J.* (La.), 1959, **22**, (2), 9.

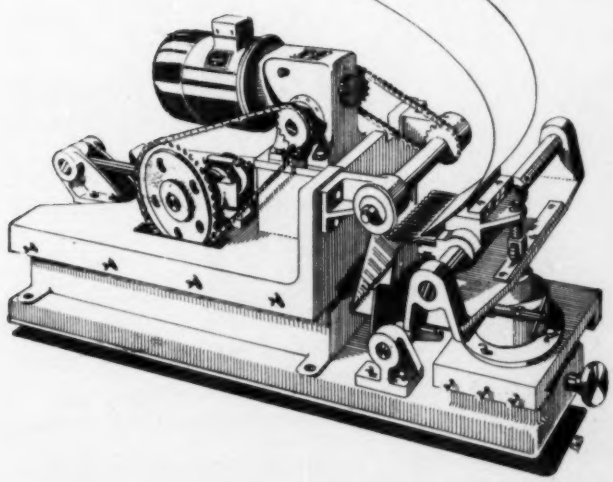
BEET SLICING
and
AUTOMATIC KNIFE SHARPENING MACHINES

AS SUPPLIED TO
THE BRITISH SUGAR CORPORATION LTD



Sugar Beet Slicing Machine. Capacity 1,200 tons/24 hrs. If desired can be fitted with variable speed drive controlled by cossette band weigher.

Automatic Knife Sharpening Machine for coarse and fine sharpening.



COCKSEDGE & Co. LTD

Telephone
Ipswich 56161 (5 lines)

IPSWICH ENGLAND

Telegrams
'Cocksedge, Ipswich'

FOR
INCREASED EFFICIENCY
+ LOWER COST
+ EX STOCK DELIVERY

CROFTS 'RADIATION' COMBINED SPUR AND WORM GEARS

This combination of spur and worm covers a range of stock ratios from 30:1 to 300:1 as a right-angle drive, which is a most useful extension of the Single Reduction Worm Gear range.

It also provides an alternative to the Double Worm Gear, whilst displaying, in many cases, a greater efficiency than either the Single or Double Reduction types.

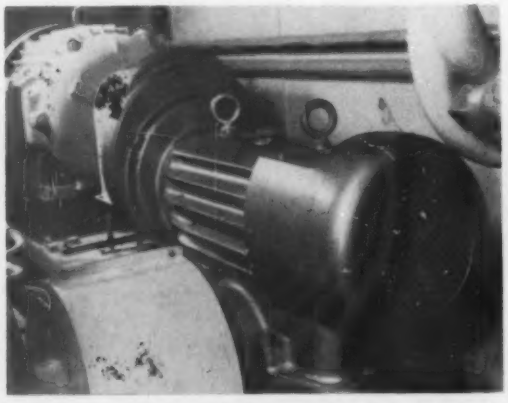
This often enables smaller and more economical units to be specified.

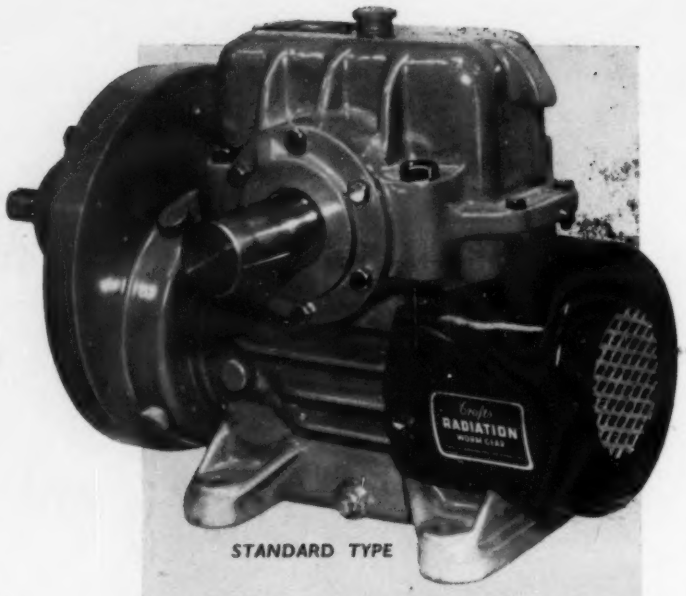
Both types provide six different mountings, including Standard, Universal and Inverted.

The STANDARD RANGE covers units up to 60 H.P. Units up to 20 H.P. are available FROM STOCK.

Larger sizes and higher ratios can be made to order.

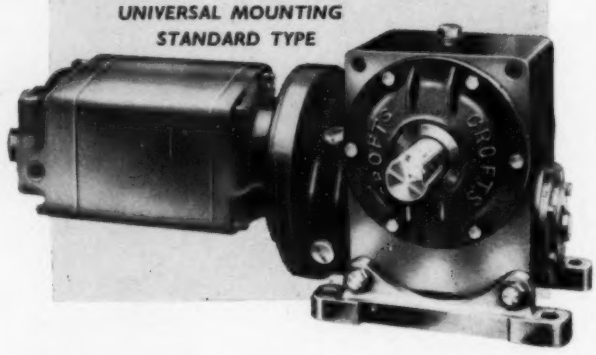
Also available as Geared Motors.





STANDARD TYPE

UNIVERSAL MOUNTING
STANDARD TYPE



Post this Coupon Today!

Crofts

☐ "Radiation" Combined Spur & Worm Double Reduction Gear Units *Publication 758*

Other "Radiation" Literature:—

☐ Combined Spur & Worm Double Reduction Geared Motors *Publication 658*

Worm Reduction Gears:—

☐ Standard Fan Cooled "R" Horizontal Type *Publication 521/A*

☐ High Ratio 'HRD' Horizontal Type *Publication 523/A*

☐ Combined Double Reduction Type (Vertical, Horizontal, & Inverted) *Publication 524/AA*

☐ Universal Mounting Type *Publication 571*

Name & Address .....

.....

.....

Please indicate which items are required ISJ

CROFTS (ENGINEERS) LIMITED

POWER TRANSMISSION ENGINEERS

THORNBURY BRADFORD 3 YORKSHIRE ENGLAND

Telephone 65251 (20 lines)

Telegrams 'Crofters Bradford Telex' Telex 51186

REPRESENTATION THROUGHOUT THE WORLD

BEET FACTORY NOTES

Intensification of 2nd product crystallization with air ventilation. A. T. KOZHUSHKO and YU. D. KOT. *Sakhar. Prom.*, 1959, (9), 26–31.—Data and graphs are given of the sugar losses to molasses for 4 factory groups in the Soviet Union, for the two periods 1935–40 and 1952–57. The mean sugar content in molasses in the earlier period was 2·06% on beet compared with 2·33% in 1952/57, although the syrup purities in 1952/57 were higher than in 1935–40. Increased molasses purity is attributed to the fact that the capacity of the pan and crystallizer stations is lower than that of the beet and juice purification end, so that the 2nd product massecuite is spun at a high temperature (50–60°C) instead of 38–40°C, and crystallization is incomplete. The disc-type crystallizers introduced into Soviet factories in recent years for 2nd product processing have a number of disadvantages, including incrustation from cold massecuite with intense cooling of the elements, seepage of the water in the discs into the massecuite through burst seams and blockage of the water channels in the discs thus inhibiting cooling, and local overcooling especially with retardation in the rate of massecuite flow; the crystallizers are also considered to be complicated and expensive. Apparatus for cooling massecuite with compressed air is described with a diagram. The compressed air passes along a feed line below which are located, at right angles, crystallizer troughs. The troughs are covered, so that air passes from the main feed through vertical branch pipes into the crystallizer and leaves via another vertical branch pipe at the other end of the trough and a main discharge line to the atmosphere. Tests have proved successful, with a drop in final molasses purity to 57·7 from an intercrystalline molasses purity before cooling of 65·8. According to the power of the compressors the cooling period can be reduced to 15–16 hr, giving a yellow sugar purity of 95–96. A 5° drop in temperature every hour is possible with a 6–8% increase in crystal yield on massecuite weight. The capital and running costs are discussed.

* * *

Electromagnetic treatment of juice going to the evaporator. M. M. NECHISTIK. *Sakhar. Prom.*, 1959, (9), 40–42.—An apparatus for juice treatment to reduce scale formation in the evaporators is described and illustrated. A cage, formed of 18 1000-mm brass tubes of 32 mm o.d. attached at each end to a flange 350 mm in dia., houses an 80-mm o.d. iron tube. This is welded to the two flanges and acts as a conductor. The cage is enclosed in 8 coils of coiled wire carrying 8 amps D.C. at 100V. The juice passes through the tubes from the sulphitation tower and then through a juice heater to the evaporators. After 194 days without cleaning the tubes in the two heaters were covered by only 0·05 mm friable scale and only a very small amount of scale was found on the walls of the 3rd and 4th effect tubes after 79 days, the 1st and 2nd effects being unaffected by scale. The syrup from the evaporators had a Brix of 55–65°.

Removal of mud from second carbonatation juice with a hydrocyclone. V. VALTER and S. BOUČEK. *Listy Cukr.*, 1959, **75**, 227–229.—Results are discussed of tests with a hydrocyclone of 80 mm dia. with a feed nozzle of 12·5 mm × 8 mm (11·3 mm dia. equivalent), a bottom nozzle of 5–7 mm dia. and a cone angle of 15°. At 3 atm feed pressure (86 litres/min) the concentrated underflow was 0·2–0·5% on the original 2nd carbonatation juice, with 88% mud removal, although over long periods this dropped to 55%. Changes in the feed pressure, feed nozzle diameter from 4 to 10 mm, and of cone angle from 15 to 10° had no appreciable effect on the purification efficiency of the hydrocyclone and it is considered that the mud particle size distribution is a more important factor.

* * *

Method of filtration of prelimed juice. Pilot plant results. E. DORMAL. *Sucr. Belge*, 1959, **79**, 53–77.—An account is given of the considerations which led to the adoption of the following scheme for pilot plant examination, viz. preliming raw juice in a Brieghel-Müller preliming apparatus; pumping to a heater and passing through a Dorr-Oliver ultra-thickener; filtration of the muds on an Oliver rotary filter; liming and carbonatation of the clear juice with recycling of muds; and pumping of the 1st carbonatation muddy juice through a hydrocyclone to give clear 1st carbonatation juice and a concentrated calcium carbonate. Aspects of the individual stages are discussed in some detail as are the relative merits of employing a hydrocyclone, rotary filter and decanter, each with a centrifugal. The pilot plant tests have confirmed laboratory results, i.e. that it is desirable to have a second liming and second carbonatation; that use of 0·8% CaO (0·2% preliming + 0·5% 1st liming and 0·1% 2nd liming) is sufficient to give a juice of the same quality as that given by twice this amount of lime in the classical process; and it is not necessary to filter the 1st carbonatation juice from the hydrocyclone if the material in suspension is pure calcium carbonate. A plant scale trial is to be carried out at Oreye. Work is also being carried out on the value of the flocculated material as a soil conditioner and for incorporation in beet pulp fodder as in "Betfor" and "Sepa" pulp.

* * *

Microbiological factory control in south German sugar factories. S. LORENZ. *Zeitsch. Zuckerind.*, 1959, **84**, 508–517.—Experiences from the 1958/59 campaign concerning bacterial infection are discussed, with emphasis on those points where disinfection was incomplete, viz. diffusion towers and pre-defecation trough (Brieghel-Müller). The use of disinfectants and alternating the type of disinfectant (to overcome immunity of bacteria to one particular type) are discussed, with a recommendation for automatic dosing. A white sugar standard is suggested and causes of sugar degradation, especially in silos, are

dealt with. Various equipment, including ultra-violet lamps and tubes, aerosol apparatus and automatic spray apparatus, is described and illustrated.

* * *

The Assalini-B process, a new method of molasses de-sugaring. H. SCHWIECK. *Zucker*, 1959, **12**, 502–508.—The process for removal of electrolytes and other non-sugars from molasses is based on the Donnan effect (neutral salts adsorption) with a cation exchange resin, and on the Wheaton-Baumann effect (ion exclusion) with the anion exchange resin. Rohm & Haas "IRA-401-S" anion exchange resin and "XE-200" cation exchange resin are used. The molasses is diluted 1:1 with an 8–10°Bx fraction (recycle) of 3–5 pol, 50 or less purity, and pH 9–11. The diluted molasses fractions are passed simultaneously through the columns, and the treated samples combined to give a clear, non-turbid final product of 12·5–13·5°Bx, 9·8–10·5 pol, 70–80 purity, and light-to reddish-brown in colour. After heating to 125°C and evaporation to 70°Bx, the resultant syrup corresponds approximately to a B green syrup, boiling to a C-massecuite. A contact time of 25 min in the anion and of 20 min in the cation exchanger is required. One cycle lasts 120 min, during which 1·8–2·0 cu.m. of molasses is treated per cu.m. of each resin. Diluted molasses viscosity must not be >15–18 centipoises. Sugar recovery is 1·1% on beet, with sugar losses of 0·08% on beet. Full details are given of tests and of the economics.

* * *

Modern anti-corrosion paints. D. HEINS. *Zucker*, 1959, **12**, 513–514.—Cold hardening epoxy resin paints are described, which have excellent anti-corrosion properties.

* * *

Investigations on the application of ion exchange resins to purification of sugar juices. E. WALERIANCZYK, K. KOPERA and A. JARZECKI. *Gaz. Cukr.*, 1959, **61**, 271–276.—Results of pilot-scale tests carried out at Witaszyce sugar factory on de-liming thin juice with "IMAC-C 12" cation exchange resin and decolorizing clarified syrup with "Asmit 259" are given in detail The mean deliming effect was a reduction of lime salts in thin juice from 121·9 to 16·4 mg/100 Bx at a temperature of approximately 75–76°C. Clarified syrup colour was reduced from e.g. 58·3 to 15·6°St/100 Bx, the lime salts were raised from 44·8 to 45·0 mg CaO/100 Bx, and ash fell from 0·367 to 0·348%, at a pH of 8·71. A suggested scheme using "Asmit 259" is described with a diagram.

* * *

Polyelectrolytes as coagulating agents in the sugar industry. III. K. DUSEK and J. BURIÁNEK. *Listy Cukr.*, 1959, **75**, 241–246.—On the basis of laboratory tests, sodium polymethylacrylate was added to 1st carbonatation juice and was found to improve clarification and filtration at a concentration of 10 p.p.m. Laboratory tests with other synthetic polyelectrolytes were carried out, the most effective being VM (a co-polymer of vinylacetate and maleic hydrazide) which raised the sedimentation rate by 33% after 6 min and by 93% after 30 min, compared with the sedimentation obtained on settling juices which had been treated with sodium polymethylacrylate. The VM polyelectrolyte is also cheaper and can be prepared in powder form. Further experiments were made, in which synthetic polyelectrolytes were tested on soil and clay suspensions. The most effective compounds were partially hydrolysed polyacrylonitriles. Graphs are presented showing the relation of flocculation to the extent of hydrolysis and show maxima at 15% and 30%, depending on whether the concentration of the soil suspension is 5 or 10%. Such polyelectrolytes would be most suitable for treatment of wash and flume waters.

* * *

Softening thin juice with cation exchange resins at Opava sugar factory. P. STRANSKY and V. VALTER. *Listy Cukr.*, 1959, **75**, 246–253.—Details are given, with a diagram, of an ion exchange plant for deliming thin juice, installed at Opava during the 1958/59 campaign. The plant comprises two "Lewatit 100" cation exchange columns, the resin being regenerated with 0·02% NaCl (0·13% on beet and washing with 15 volumes of water). The juice hardness was reduced on average over the campaign from 12·3° to 0·7°. The effective resin capacity was 40·1 kg CaO/cu.m. Regeneration can be made more effective and shortened by regulating the concentration of the salt solution and re-utilizing later fractions. The capacity of the evaporator station was increased by 10–15%, fuel requirements were cut, and pan work was easier.

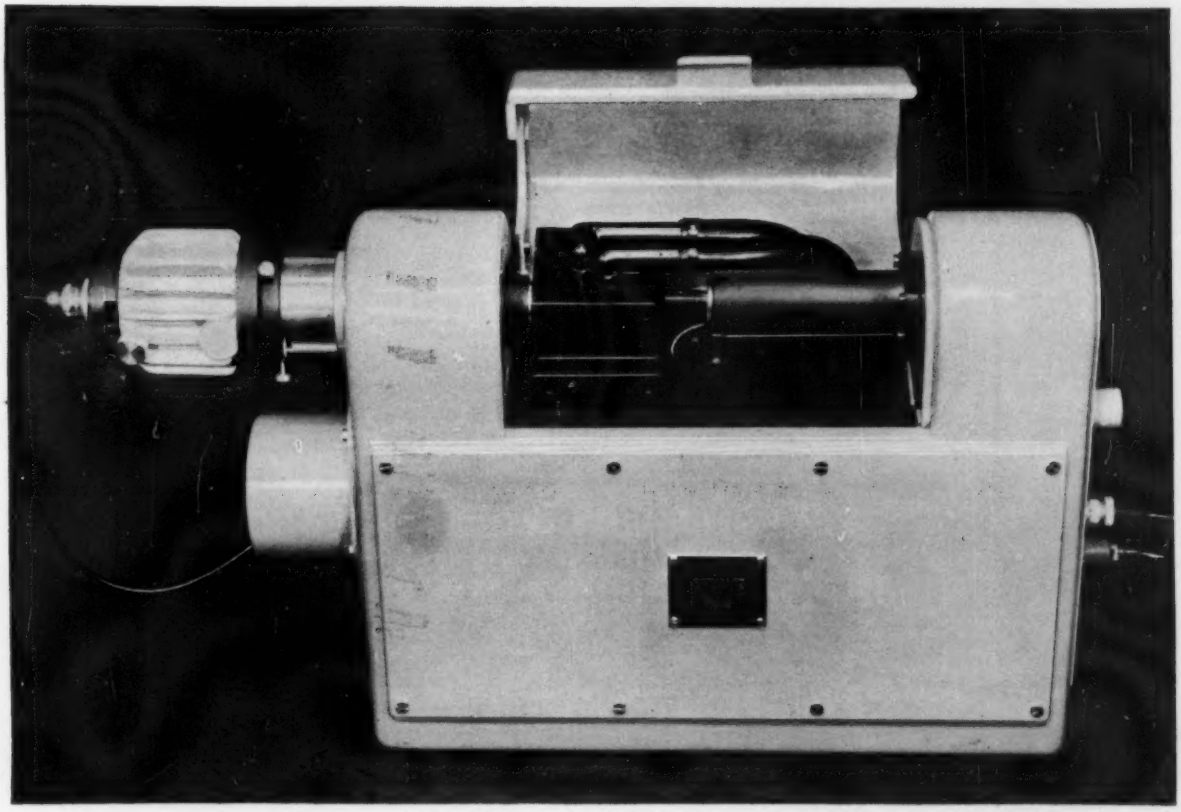
* * *

Losses in storage of beet harvested by combine, compared with beet lifted manually. M. DRACHOVSKÁ, J. JAROS and V. KEC. *Listy Cukr.*, 1959, **75**, 253–255.—Daily pol and sucrose losses in combine-harvested beet stored in 1958 were found to be 0·03% and 0·15% respectively, while the corresponding losses in stored beet lifted manually were 0·01% and 0·03–0·06%.

* * *

Thin juice deliming with ion exchangers. H. HARTL. *Zucker*, 1959, **12**, 534–542.—An ion-exchange plant at Tulln factory for de-liming thin juice is described in detail with diagrams. The plant, with ancilliary equipment, includes 3 vessels, each containing 6·5 cu.m. of strongly acid "IMAC C 12" cation exchange resin, working on the Na cycle. The resin has a total capacity of 1800–1900 equiv. per cu.m. The plant is designed to allow parallel flow through 2 vessels, while the third is being regenerated. For regeneration 1244 kg salt are required per vessel, some 300 kg being recycled for re-use in a second regeneration. A graph is presented of the hardness of the juice before and after treatment. No scale or corrosion was found in the evaporators. Details are given of the heat economy of the factory.

THE *Continuous Flow* REFRACTOMETER



A new automatic instrument for
monitoring and control in Confectionery Production,
Sugar Refining, Brewing, Food Processing,
and all industries dealing with transparent liquids

Write for full details

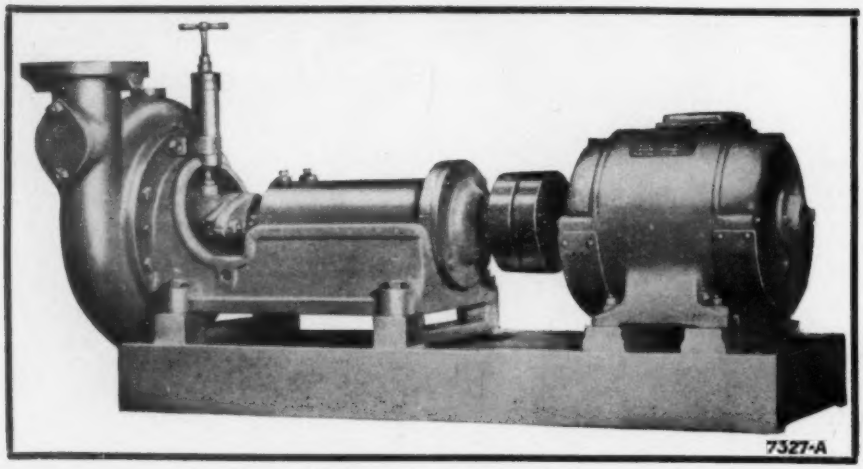
HILGER & WATTS

98 ST PANCRAS WAY · LONDON · NW1

TELEPHONE: GULliver 5636

Streamline

MILL IMBIBITION PROCESS



MIRRLEES CHOKELESS PUMPS

Recent installations :

VENEZUELA—
El Palmar and Rio Turbio ;

PUERTO RICO—
Central Guanica ;

CUBA—
Palma ; Ermita, Providencia ;

BRITISH WEST INDIES—
Basse Terre, Antigua, Corozal, Richmond, Rosehall, Hampden ;

DOMINICAN REPUBLIC—
Boya, La Romana.

Install Mirrlees Unstrained Return Juice Pumps in conjunction with scraper, rotary or vibrating screens.

★

Full information on request :

The MIRRLEES WATSON COMPANY LIMITED

Head Office and Works : SCOTLAND STREET, GLASGOW, C5.
London Office : 38 Grosvenor Gardens, S.W.1.

Methods of juice purification. A. BRIEGHEL-MÜLLER *Zeitsch. Zuckerind.*, 1959, **84**, 557–564.—A review is given, with 29 references to the literature, of various juice purification schemes, including the D.d.S. direct flow saturation, Seailles continuous saturation, saturation of defecation juice with added over-saturated juice, simple carbonatation, the Dorr, Odens, Görlev carbonatation systems, the Schneider fractional carbonatation method and the Wiklund process. The Brieghel-Müller pre-liming method is also mentioned. The methods are considered with particular regard to the textures of the muds. Emphasis is laid on the importance for practical purposes of the reaction conditions under which adsorption complexes are formed from calcium carbonate and organic colloids.

* * *

Further studies on the establishment of optimum conditions for beet storage. II. A. KARATNICKI. *Prace Inst. i Lab. Badawczych Przemyslu Rolnego i Spozywczego*, 1958, **8**, (3), 1–13; through *S.I.A.* 1959, **21**, Abs.618.—The earlier methods of beet storage were used at 10 factories during the 1955/56 campaign and 8 factories in the 1956/57 campaign; the results are tabulated. The use of mats, whilst giving slightly better results than by the use of lime alone, is time-consuming and expensive and the latter method is therefore recommended; there was a difference of less than 0·002% sugar loss between the two methods.

* * *

Extraction of sugar by direct defecation of beets. A. BONELLI. *Ind. Sacc. Ital.*, 1959, **52**, 399–411.—The author's process was originally described in 1946[1], and included the treatment of pulped beet with 0·6–0·8% of CaO, pressing, and then washing the pressed pulp to extract the remaining sugar content. The combined juice and washings were treated with 0·1–0·3% CaO and filtered before concentration and further processing. The process gave a juice of higher purity than usual, but commercial presses of that time were not adequate to permit adoption of the process. Modern pulp presses operate at higher pressures and so factory trials were carried out at Bondeno in 1958. The aim was the application of the process to beet tails, and was modified in that the pressing was only partial, i.e. to extract only 30–50% of the beet as juice. The pressed material was extracted in the cold in an ordinary battery and the combined juices processed. The juice was clear, colourless and of high density and the beet was completely exhausted with a draught of little more than 100% on beet. This would permit an increase in factory capacity without alteration of the concentration stations. First carbonatation is replaced by a carbonatation in two stages, and the amount of exhausted pulp is smaller. Other achievements include a coal saving of up to 20% and a reduction of 0·25–0·3% on beet in the losses. Costs cannot be higher than the normal processes.

Utilization of ion exchange resins in the sugar industry. G. MANTOVANI. *Ind. Sacc. Ital.*, 1959, **52**, 418–423.—A review of the recent literature, with 16 references.

* * *

Remedying defects in equipment of (Steffen) separation plants. A. N. SHAKIN, L. E. FLEISHMAN, and R. K. KAZIMIROV. *Sakhar. Prom.*, 1959, (10), 11–18.—Fluctuations in the purity of saccharate milk from 85 to 91·9 have been caused by poor quality lime (with low active CaO content), seepage of alkali into the saccharate in the reaction vessels, and wide fluctuations and insufficiency of vacuum (200–300 mm) in the vacuum filters, besides other defects in the equipment. Full details with diagrams are given of the plant, including the mill, equipped with multi-vane vacuum air separator, pulverizer, and cyclone collector; the crushed lime distribution system to the hoppers; the lime wheel; the valve system on the reaction vessels; the saccharate suspension classifier, and the B-10 and B-40 vacuum filters. The double-filtration scheme is described, whereby the mud from the 1st filter is fed to a mixer for cold water dilution, then passed to the 2nd filter, the cake from which is treated in the same manner in another mixer; this is then returned to the 1st filter, saccharate milk of sufficiently high purity being fed to the factory line after the 2nd mixer.

* * *

The application of polyelectrolytes in the sugar industry. A. K. KARTASHOV, YU. D. GOLOVNYAK, R. G. ZHIZHINA and N. A. MAKSIMOVA. *Sakhar. Prom.*; 1959, (10), 24–29.—Laboratory tests were carried out, in which sodium polymethylmethacrylate, sodium alginate and carboxymethylcellulose were added to 1st carbonatation juice in a column and the settling rates determined. Juice from good quality beet of 0·07% CaO alkalinity, and from poor beet, of 0·055% CaO alkalinity, were tested. The presence of 10 p.p.m. polyelectrolyte was sufficient to cause a sharp increase in the sedimentation rate and after a very short time there was a sharp distinction between the absolutely clear supernatant liquid and the precipitate in the case of the normal juice, the supernatant being somewhat cloudy and opalescent in the case of the poor juice. In the absence of polyelectrolyte, there was no clear defining line between precipitate and supernatant liquid, even after 25 minutes' settling. Addition of more than 10 p.p.m. polyelectrolyte caused more rapid and more energetic conglomeration during the 1st minute only, but otherwise had no greater effect on clarity or settling rate. The alkalinity of the juice was found to be very important when sodium polymethylmethacrylate was used, the greatest settling rate and juice clarity being at alkalinities nearest to "normal" (0·08% CaO). The greatest inhibiting effect on the polyelectrolyte was with under-saturated juice with an alkalinity of >0·12% CaO. The greater the divergence from "normal" alkalinity, the more turbid were the

[1] BORGHI: *Chimica e l'Industria*, 1946, **28**, 177.

supernatant juices. The presence of 10–20 p.p.m. polymethylmethacrylate did not result in a completely transparent clear juice from frozen beet, originally containing 18% sugar, which had been stored in a warm place so that its sugar content fell to 8% through bacterial action. Sodium alginate was found to be slightly inferior to the polymethylmethacrylate, whereas carboxymethylcellulose had little effect even at 100 p.p.m. In most cases there was a decrease in the volume of precipitate after 25 min, especially in the case of juices with poor sedimenting qualities.

* * *

Boiling-out evaporators with soda and lime. G. I. STASEV and G. F. TYAZHELOVA. *Sakhar. Prom.*, 1959, (10), 33–34.—At Ramonsk factory the evaporator is boiled-out with calcium carbonate and caustic soda, obtained by feeding milk-of-lime from the mixer over the main liming tank into a 1·5-cu.m. tank, connected to each effect, together with sodium carbonate and water heated by steam. The $CaCO_3$ is thought to effect a mechanical cleaning by scraping, as a large amount of scale together with carbonate sediment was found on the floors of the effects.

* * *

Combined washer for very dirty beet. L. S. IZRAILEVICH. *Sakhar. Prom.*, 1959, (10), 35–38.—A diagram is presented with full details of a beet washer designed to clean extremely dirty beets. The design is based on a combination of two separate washers, the first an imported model, in which the beet are subject to vigorous rubbing together, with the aid of paddles on a central shaft, and the second a Dobrovol'sk type, with less pronounced action. In the first, the counter-flow of water is at low level, while in the other section the beets are finally washed in deeper water. The paddle shaft is common to both sections. A special mechanism is installed for transference of the beets from the 1st section to the 2nd. Retention time at 1500 tons of beet per day is 8–8·5 min.

* * *

Hydrocyclone for 2nd carbonatation juice filtration. H. STEFAN. *Zuckererzeugung*, 1959, **11**, 292–293.—Some details are given of tests on filtration of 2nd carbonatation juice, using two hydrocyclones of 135 and 80 mm o.d. A separation effect of 90% with particles of 4–6μ was achieved. The dependence of separation on the amount of muds or on the length of the overflow section (which was found to be optimal at half the overall vertical section dia.) was also studied.

* * *

Evaluation of the possibility of using beet tails with the aid of the MW factor. H. MÜHLPFORTE. *Zuckererzeugung*, 1959, **11**, 296–297.—Tests, which are to be continued, have shown that the beet tails in the beet tail catcher would yield sugar, provided that the beet are healthy.

* * *

Plasmolysis of sugar beet cell tissue. B. NOWAKOWSKI. *Gaz. Cukr.*, 1959, **61**, 303–306.—The relation between the degree of plasmolysis of beet slices and heating time and temperature was studied at 50, 60, 70 and 80°C. Barely 60% of the cells were killed at 50°C, the tissue containing the sugar generally remaining alive, while the parenchymatic tissue was killed. At 60°C plasmolysis progresses more rapidly at first and then slows, reaching about 80% plasmolysis after about 10 min. At 70°C the rind cells are almost denatured, but complete plasmolysis occurs only after 30 min. At 80°C, 83% of the cells are killed within 5 min and 100% plasmolysis occurs after 12 min, both of the rind and of the parenchymatic tissue. It is pointed out that the quality of the beet is most important in plasmolysis. Further tests on extraction of sugar were carried out, a graph being presented of the degree of plasmolysis compared with the amount of sugar extracted. The greatest difference between the two is at 60%C and the least difference is at 70°C and 80°C, with complete diffusion after 23 and 35 min respectively, compared with 40 min at 60°C.

* * *

Prevention of overloading of a beet washer. S. ZAGRODZKI and J. DOBRZYCKI. *Gaz. Cukr.*, 1959, **61**, 306–308.—An automatic scheme for regulating the flow of beets from the flume to the washer and thence to the hopper above the slicer is described, in which signals are transmitted from level indicators at the hopper to a control panel. These signals are used to control the speed of the beet wheel at the flume, which speed increases as the level falls. When the hopper is full, a signal sequentially halts the bucket elevator drive and washer and then closes a lattice in the flume to prevent further flow of beet. Signals from the beet pump and conveyor between the elevator and hopper will also close the lattice. An empty hopper is indicated by an alarm signal, as is closing of the flume lattice.

* * *

Prerequisites for economic choice of steam turbines. J. NOWAKOWSKI. *Gaz. Cukr.*, 1959, **61**, 309–313.—Steam flow and power generation diagrams and turbine blade velocity diagrams are presented in this discussion. It is concluded that for a 2000-ton factory a turbine is required of such a size that would have a steam consumption of about 13 kg/kWh, using 23 atm steam. Comparative data are tabulated for 14 different types of turbine (Polish, Czechoslovakian, Swedish and German). The steam consumption per kWh can be 1·5–2 kg lower at 36 atm, which for a 2000-ton factory is equivalent to 400 kWh. Such high pressures can be used without raising the cost of the turbine construction.

RUTHS STEAM ACCUMULATOR
FOR FLACQ UNITED ESTATES SUGAR FACTORY, MAURITIUS
MADE BY COCHRAN & Co. ANNAN Ltd. SCOTLAND
CAMIONAGE MAXIME CAYEUX

One of the two Ruths Accumulators supplied to Mauritius

This steam user proved that

STEAM STORAGE

increased factory efficiency and production

As part of an expansion scheme Flacq United Estates Sugar Factory of Mauritius installed two Ruths Accumulators with the result that the existing boiler plant became capable of supplying steam at a steady pressure to the greatly increased process consumers. In addition the increased production is going on with improved efficiency.

The customer states ". . . it is beyond any doubt that the two accumulators . . . have to a very considerable extent helped in attaining this remarkable achievement".

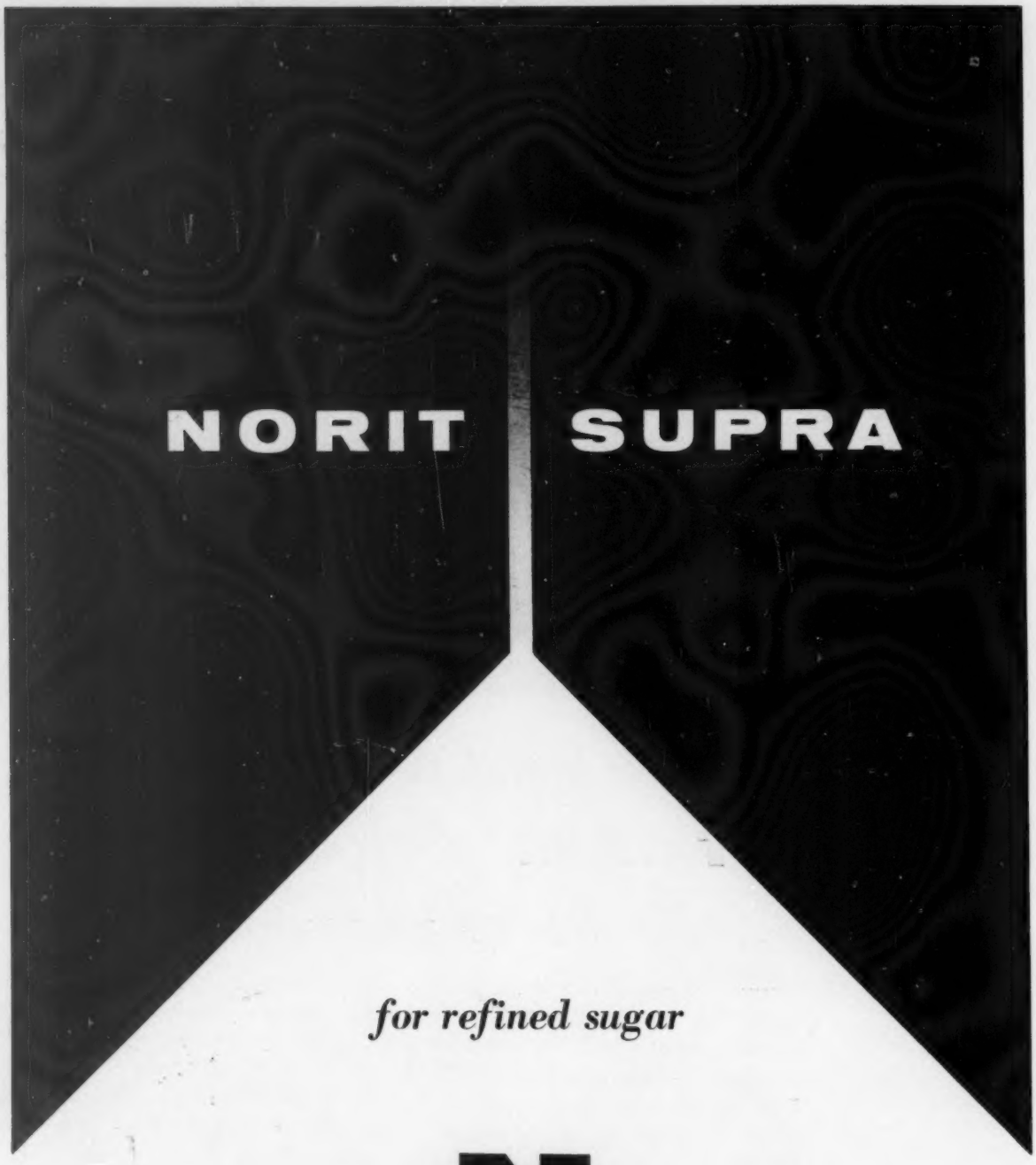
Cochran, the makers of Ruths Steam accumulators, are glad to supply schemes to solve factory steam problems, and invite you to avail yourself of their experienced technical service.

RUTHS
Regd. Trade Mark

STEAM ACCUMULATORS

COCHRAN & COMPANY, ANNAN, LIMITED, 34 Victoria Street, London, S.W.1. Abbey 4441 and at ANNAN, DUMFRIESSHIRE, SCOTLAND. Annan 111

TAS/CH 680



for refined sugar

No-4-30

NORIT

UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND

New Books and Bulletins

Handbook of Cane Sugar Engineering. E. HUGOT, translated by G. H. JENKINS. 872 pp; 6½ × 9¾ in. (Elsevier Publishing Co., 110–112 Spuistraat, Amsterdam C, Holland.) 1960. Price: 170s. 0d.

The title of this book seems to be somewhat startling since this "handbook" is a large volume packed with information and destined for its place among the reference books of the cane sugar engineer. M. HUGOTS's *Sucrerie de Cannes*," published in 1950[1], has long been recognised as an excellent and comprehensive survey of cane sugar manufacturing equipment, but its publication in French has limited to some extent the readiness with which it has been used in the whole of the sugar world. Now we have the version in English which, in addition to the translated original text, has been revised and amplified so as to make it the most thorough and up-to-date work on cane sugar engineering. In particular, new treatment has been given to such items as individual hydraulic accumulators, turbine drive for mills, circulation in vacuum pans, and Queensland's characteristic milling equipment, while figures and tables are given either in British or both metric and British units.

As books go, the Hugot-Jenkins "Handbook" is expensive, but its cost is negligible compared with the immense value to be gained from it by cane sugar engineers and their employers. This book has been needed for a long time; we are very glad to report that it is here.

* * *

F. O. Licht's Internationales Zuckerwirtschaftliches Jahr-und Adressbuch 1958/59. (International Sugar Economic Year Book and Directory 1958/59). H. AHLFELD. 396 pp. + 59 pp.; 8½ × 11⅝ in. (F. O. Licht K.G., P.O. Box 90, Ratzeburg, Schleswig-Holstein, Germany.) 1959. Price: 55s. 6d.

The latest in this valuable series follows the same pattern as in previous editions while being brought up to date. Its first section includes accounts of the laws affecting the German sugar economy and of delivery and payment terms for sugar factories, and the text of the International Sugar Agreement of 1958. In the second section are data—addresses and officers, etc.—of the various sugar organizations in Germany, Federal Government departments, yeast plants and distilleries, and also a short section concerning Eastern Germany.

The various international bodies and sugar organizations of European and non-European countries make up the third section while the fourth gives details of the sugar importing companies of Europe and elsewhere. The next two sections deal, respectively, with the factories and refineries of the beet and cane sugar countries, giving names, locations, capacities, etc.

The seventh section is a series of articles, the first an analysis of the problems of the European sugar economy within the E.E.C. and Free Trade Area, the second on the number of seeds in a beet seed cluster and the practical significance of this in breeding, a review of recent laboratory advances including photoelectric polarimeters, the use of flame photometers, EDTA titration of hardness in juices, chromatography, pH measurement, automatic process control, ion exchange techniques, control of evaporation, boiling and centrifugals, etc. Equipment supplied for use in beet sugar factories is surveyed with the German manufacturers clearly indicated. A number of articles by individual manufacturers describe and illustrate their products. The factory atlas this year is devoted to the sugar-producing areas of Africa, while the last section includes a Buyers' Guide, and English-German vocabulary, and a list of sugar journals and market reports. A pocket inside the back cover holds a supplement recording sugar statistics of Germany, Europe, the world, and individual countries.

* * *

Sugar in the West Indies and British Guiana. 96 pp; 6½ × 9½ in. (British West Indies Sugar Association Inc., Barclays Bank Building, P.O. Box 170, Bridgetown, Barbados, W.I) 1959.

This, the 1958 handbook of the B.W.I. Sugar Association, is in a new format, being larger and with card instead of the former cloth binding. It is four years since the previous edition was published but it is hoped to publish new editions at least every second year in future. Certainly the new handbook provides a thorough survey of sugar in the West Indies which is brought up to date as far as 1958. It is in nine parts, the first seven being in the form of surveys, the eighth a directory of sugar industry organizations and the ninth a statistical section giving cane acreages, cane crops, sugar production, consumption, prices, etc.

The first part describes what sugar means to the West Indies while the second is a historical sketch of the sugar industry in the West Indies and British Guiana. Succeeding parts include surveys of the work of the B.W.I. Sugar Association from 1955 to 1958, sugar technology research at the Imperial College of Tropical Agriculture, the work of the B.W.I. Central Sugar Cane Breeding Station in Barbados, field research in progress or planned in the islands and British Guiana, and progress reports on pests and diseases.

[1] See *I.S.J.*, 1950, **52**, 376.

Laboratory Methods and Chemical Reports

Cationic dye adsorption in sugar cane juice. M. C. BENNETT and D. A. HAYDON. *J. Appl. Chem.*, 1959, **9**, 482–486.—The adsorption of cationic dyes at the surface of particles in suspension in cane juice has been studied electrophoretically over the pH range 4–7. It was found that the reversal of charge concentrations (C) depends upon the original zeta potential (ζ_o) of juice particles before addition of the dye; the relationship between C and ζ_o is linear for methylene blue, which does not change in basicity over this pH range. With bismark brown the basicity does change gradually over the whole of this range but it appears that the adsorption is governed to a greater extent by a colour change, having the form of a simple dissociation of pK 5·10, than by the total charge of the dye molecule. It is shown that each of the two coloured forms of the dye obeys a linear relationship between C and ζ_o. A theoretical linear relationship is derived from the Stern and Gouy equations.

* * *

Determination of the moisture content of beet pulp. E. NEBE. *Zucker*, 1959, **12**, 434–435.—A method of determining the moisture content of beet pulp as a function of the dielectric constant is discussed. A calibration curve of samples containing 4–12% sugar and 4·7–10% moisture is presented, a DK 03 dekameter of the Wissenschaftlich-Technischen Werkstätten, Weilheim/Obb., being used. The determinations can be made to within an accuracy of ±0·03%.

* * *

Paper chromatographic determination of raffinose in molasses. R. WEIDENHAGEN and H. SCHWIECK. *Zeitsch. Zuckerind.*, 1959, **84**, 443–445.—A method of determining the raffinose in molasses is described, whereby lead acetate is added to a molasses solution and the washed and filtered precipitate and the filtrate washings are deionized and concentrated to 10–15°Bx. The dry solids content, pol, purity, and the g pol sugar per ml of concentrate are calculated as $\frac{°S \times 0{\cdot}52}{100}$. The amount of raffinose in a series of samples is determined chromatographically, using *n*-propanol : ethyl acetate : water (7 : 1 : 2) as solvent, and water : *n*-butanol : benzidine : trichloroacetic acid (10 : 90 : 0·5 : 10) as spray reagent. The spot size is determined planimetrically and the raffinose is calculated from a reference curve obtained from

$$y = 0{\cdot}164 + 0{\cdot}03243\ x - 0{\cdot}000176\ x^2$$

where y = spot size in sq. mm. and x = raffinose anhydride in μg. From the amount of raffinose its equivalent as pol sugar ($\gamma \times 1{\cdot}852$) is obtained; this from the pol sugar present in the sample gives the sucrose content, and hence the ratio of raffinose to sucrose can be calculated to within an accuracy of ± 5% raffinose on pol-sugar (2·5% on molasses).

* * *

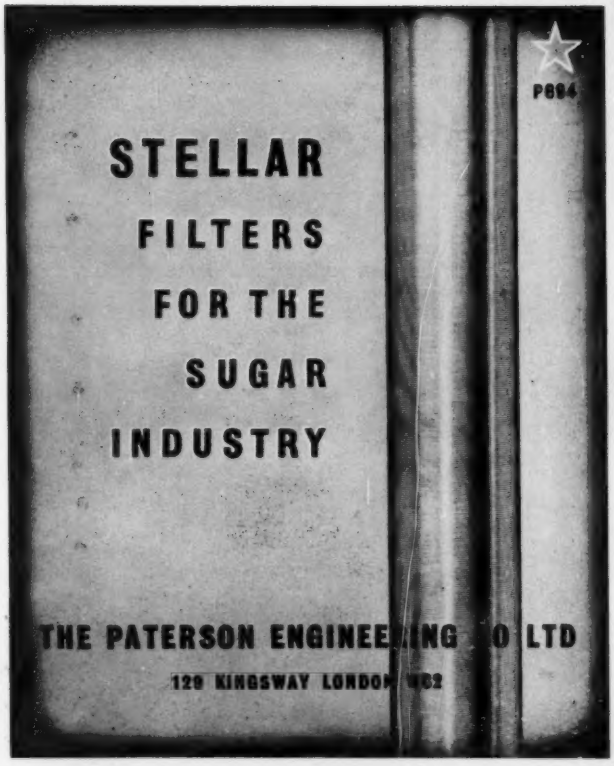
Quantitative determination of lactic acid in sugar factory juices. V. PREY, O. SZABOLCS and I. SZABOLCS. *Zeitsch. Zuckerind.*, 1959, **84**, 452.—A rapid method of lactic acid determination is described. The amino-acids, non-N acids and pyrrolidone carboxylic acid are extracted by an ion-exchange method previously described[1] and colorimetric analysis of the eluate is carried out, 100 g of lactic acid in the eluate being needed. If large amounts of H_2SO_3 and galacturonic acid are present, paper chromatographic separation of the lactic acid must precede the colorimetric analysis. The chromatographic paper, after application of the sample, is treated with ethyl acetate : glacial acetic acid : water (8 : 1 : 1), dried and cut into strips, which are placed in the cell of a Lange colorimeter and rinsed with water. After addition of 0·1 cc. of 10% copper sulphate to the cell, followed by 8 cc. of H_2SO_4 and 0·1 cc. of alcoholic thymol solution, the solution is stirred, heated for 15 min in a boiling water bath, again stirred, and the extinction measured with a heat-resistant bright green filter. A blank determination is run with water. A calibration curve is presented.

* * *

The determination of alkalinity and reaction in raw sugars. S. BÖTTGER and W. STEINMETZER. *Zeitsch. Zuckerind.*, 1959, **84**, 456–457.—The phenolphthalein method of determining the alkalinity of raw sugars is not considered suitable because of difficulty in determining the end point at pH 8·2–8·3, the colour change for white sugar and slightly coloured raw sugars being easily detected at pH 8·2 ±0·1, whereas the change with dark solutions is difficult to detect and is spread over a pH band of ±0·3 (i.e. 7·9–8·5). The buffering action of raw sugar in the region of the phenolphthalein colour change has been found to depend on the sugar quality. Electrometric determination of pH was carried out at 20°C, two standard buffer solutions for pH 7·0 and 9·0 being used for the reaction limits of 1st and low-product sugars. The first buffer solution consisted of 61·2 parts of a solution of 11·876 g $Na_2HPO_4,2H_2O$ in 1 litre of water and 38·8 parts of a solution of 9·078 g KH_2PO_4 in 1 litre of water; and the second buffer (pH 9) of 12·4 parts 0·1 *N* NaOH and 87·6 parts of a solution of 7·505 g glycine + 5·85 g NaCl in 1 litre of water. The solvent water was adjusted to pH 9·2 with HCl or NaOH at 20°C, and the pH if the raw sugar dissolved in this was determined. The buffering degree (Δ pH)

[1] *See I.S.J.*, 1959, **61**, 344.

YOU MUST SEE THIS



It's the *new* booklet about a new filtration technique . . . STELLAR. In its pages are described and pictured the functions of Stellar Filters in the clarification and polishing of sugar syrups. You'll find it well worth reading. May we send you a free copy?

Write: Stellar Department
Paterson Engineering Co. Ltd.
129, Kingsway, London, W.C.2

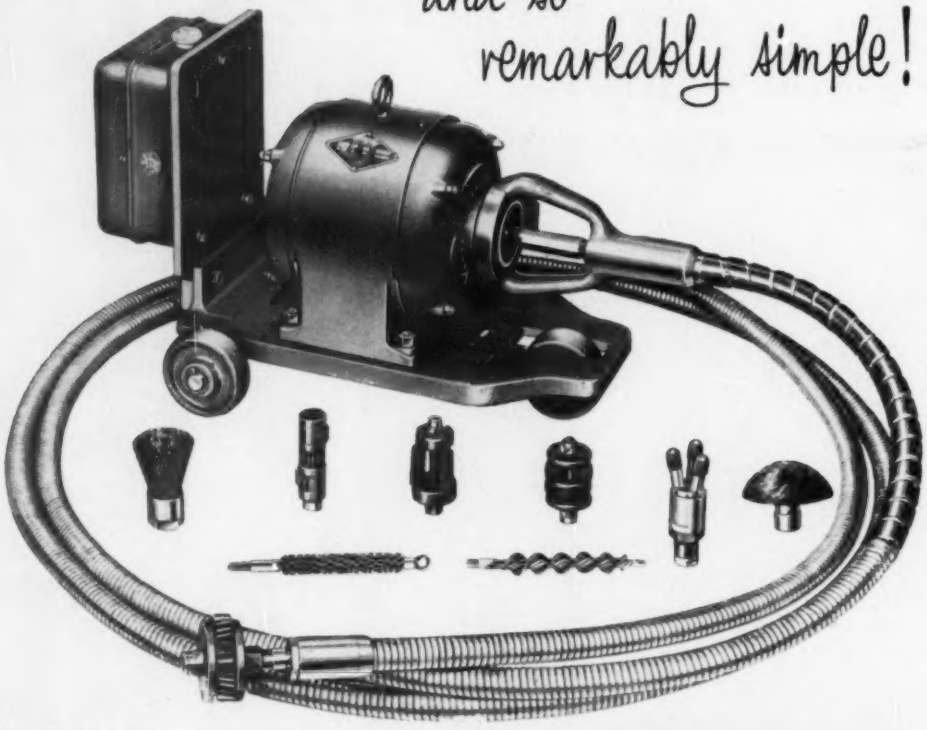
SKATOSKALO

TUBE & SURFACE SCALING EQUIPMENT

POWERFUL PENETRATING POSITIVE

and so remarkably simple!

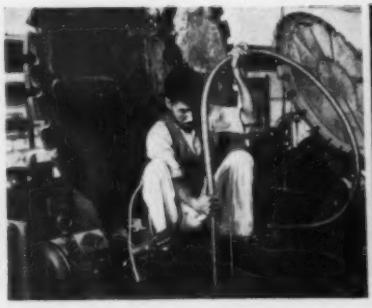
Electric, Petrol or Air driven.



Our unrivalled experience of scaling methods—and problems—has enabled us to develop a range of scaling machines, tools and accessories without equal.

However obstinate and tenacious the deposits become, "Skatoskalo" toolheads and brushes will remove them entirely, leaving clean burnished surfaces which delay the formation of fresh deposits.

Use "Skatoskalo" equipment regularly to restore boilers, economisers, evaporators, juice heaters, condensers and triple effets to full thermal efficiency.



CARLTON HOUSE
HIGH STREET

Flexible Drives (Gilmans) LTD.

SMETHWICK
STAFFS, ENGLAND

Cables: Skatoskalo Birmingham

Code: Bentleys

AGENTS IN ALL CANE & BEET SUGAR PRODUCING AND REFINING AREAS.

of the sugar was determined (i.e. the difference in pH between the result of the determination and the pH of the same solution after addition of 1 ml HCl. The smaller the value of the buffering degree, the better is the keeping quality of the sugar.

* * *

Modification of the viscosity of pure sucrose solutions by addition of some dissolved non-sugars or of crystals in suspension. P. NAFFA and C. FRÉGÉ. *Sucr. Franç.*, 1959, **100**, 179–184; 207–214; 237–241.—The phenomenon of viscosity and its measurement is described and the literature on viscosity of pure and impure sugar solutions is reviewed. Betaine and the calcium and potassium salts of pyrrolidone carboxylic acid are characteristic impurities of beet juice and their effects are compared with those of potassium chloride, acetate and oxalate. The measurements were made with a Brookfield torsion-type viscometer at 20 ± 0·05°C. The resultant measurements for solutions are tabulated and illustrated in the form of graphs. Betaine was found to reduce both density and viscosity when it replaced part of the sucrose; a mixed solution, however, was more viscous than a pure sucrose solution of the same density. For a constant ratio of sucrose to water, the addition of the salts mentioned increased the viscosity except for KCl. For the same density, solutions of pure sucrose were of higher viscosity than impure solutions. For the same concentrations, the viscosity of sucrose and potassium salt solutions increased in viscosity in the order chloride < oxalate < acetate < pyrrolidone carboxylate < sucrose. The effect of calcium salts was greater than the equivalent weight of the corresponding potassium salt. It therefore seems that both cations and anions exert specific effects so that the viscosity of the impure sugar solution is the resultant of these effects and the concentration. Sugar crystals were sieved and their fractions added in aliquots to a saturated sucrose solution, the mixture stirred and the viscosity measured. The effect of the solids % sucrose in solution was drawn in graph form for the various grain sizes and produced straight lines very close together on semi-log paper. The viscosity increased sharply at higher solids %, the effect being greatest with the large crystals (20–30 mesh) and least with average crystals (40–60 mesh). The large and fine grains had intermediate effects. Addition of a surface active quaternary ammonium salt to a suspension to affect the viscosity gave inconclusive results.

* * *

State of microbiological research in the sugar industry. S. LORENZ. *Zucker*, 1959, **12**, 478–491.—A review of microbiological research in the sugar industry, with introductory historical notes and reviews of work on the destruction of sucrose, disinfection, and research methods. Numerous photomicrographs in colour and black-and-white are presented, and a number of useful disinfectants with their properties, field of action, and some effects on bacteria are tabulated.

Determination of the sucrose content of sugar beet by isotope dilution methods. H. HORNING and H. HIRSCHMÜLLER. *Zeitsch. Zuckerind.*, 1959, **84**, 499–507.—A radio-isotope method of checking the usual methods of determining the sucrose content of beet was tested, whereby 1 g of ^{14}C-labelled sucrose was well mixed in with 15 g of beet pulp and the mixture cooled to about —60°C in a Dewar vessel with dry ice and acetone. The mixture was then dehydrated under vacuum and the sucrose extracted during 12 hr with diethylamine (dried over sodium wire). After evaporation and washing with 96% ethanol and acetone, the sucrose was weighed, then dissolved in a copper sulphate solution (1 g sucrose in 2·7 ml solution). The crystalline sucrose-copper sulphate precipitate was then filtered off, washed, dried in air, and heated with 1–2 ml collidine to dissociate the copper sulphate complex. The solution was filtered free of the collidine-copper sulphate precipitate, and evaporated to a syrup. Ethanol in excess was added to crystallize the sucrose, which was pressed into 300 mg tablets. The radio-activity was measured with a methane-filled counter. The sucrose had a counter activity of more than 10,000 impulses/min, at which the error was roughly ± 0·3% over a measuring period of 100 min. Comparison of results with those obtained by hot and cold water digestion, disintegration method, and alcohol extraction, shows that the isotope method gives higher sucrose contents than the conventional methods, while after several weeks' storage at —3°C the sucrose content in the same sample falls, according to the isotope method, and increases as determined by the other methods. This discrepancy still existed after elimination of the error due to water evaporation. The isotope method results agree closest with the alcohol extraction figures. The results are inconclusive, but comparative tests are being continued.

* * *

The determination of betaine. O. SZABOLCS and V. PREY. *Zeitsch. Zuckerind.*, 1959, **84**, 517–518.—For quantitative determination of betaine, the thin (150 g) or thick juice (50 g) or molasses (10 g) diluted to 50 ml is passed through a 50-ml burette filled with "Amberlite IRC 50" ion exchange resin. The sample is passed through in 15 min, and the resin then washed 3 times with 10 ml distilled water to pH 6–7. N/10 NaOH is added to the zero mark of the burette and run out dropwise into a bromthyomol blue indicator. The spot method is applied until deep coloration, which marks the start of the betaine breakthrough. Alizarin yellow R is then used till rose coloration, then the spot method again applied until deep red, indicating breakthrough of the NaOH. From the difference between the amounts of NaOH used is calculated the betaine content, 1 ml NaOH being equivalent to 0·045 g betaine. More accurate results are obtained by using potentiometric or, preferably, conductimetric apparatus instead of indicators. The ion exchange resin should have a capacity corresponding approxi-

mately to 10 ml N NaOH. The sample is run through the resin, then washed with conductivity water to pH 7 (a conductivity of $k = 2 \times 10^{-5}\Omega^{-1}cm^{-1}$). N/10 NaOH is added and the sample eluted and the pH values or conductivity plotted against the flowing NaOH to give a reference curve. The NaOH breakthrough at pH 11 is indicated by $k = 12 \times 10^{-5}\Omega^{-1}cm^{-1}$. In both cases, an accuracy to within $\pm$ 5% is possible. A combination of the two methods is suggested.

* * *

Ion exchange method for total acid determination in sugar beet and sugar factory juices. K. BOHN. *Zuckererzeugung*, 1959, **10**, 272–276.—With this method, 25 ml of thin juice, 10 g of thick juice or 5 g of molasses, the thick juice and molasses diluted to about 10–15°Bx, are passed through a phenol sulphonate cation exchange resin, of the type "KPS 200" of VEB Farbenfabrik Wolfen, with an effective capacity of 1–2·2 meq/ml during 10–15 min. The eluate is passed into a 300 ml Erlenmeyer flask, and the exchange column is washed twice with 50 ml of water and the wash water added to the eluate, which is then titrated with N/10 NaOH using phenolphthalein indicator. (Potentiometric determination is preferable for accurate results because of the slight colour change.) If raw juice or press juice is used, the resin is added to 250 ml until it reaches pH 3 and flocculation occurs. After settling of the coagulate, the juice is decanted and filtered over kieselguhr (or "Columbit"), and 25 ml of the clear filtrate passed through the column. The resin must first be vacuum dried, as the juice will otherwise be diluted by the water adhering to the resin. The total acids is given as meq/litre (10°Bx) or meq/100 g dry solids. Checking the method showed little scattering over 5 results, the error being less than $\pm$ 1%. Amino acids and CO_2 are not detected by this method. Some data are given on the total acids content of press juice, raw juice, thin and thick juices as a guide.

* * *

The application of a chromatographic method in a study of changes in the carbohydrate complex in sugar beet during long storage. O. V. BRAUN. *Zhurn. Priklad. Khim.*, 1959, **32**, (9), 2084–2090.—Paper chromatographic study of the chemical changes in beet is discussed (with 24 references to the literature), with particular reference to determination of raffinose and kestose. *n*-Butanol:acetic acid:water (5:1:2) was used as solvent, and α-naphthol:orthophosphoric acid : methanol (0·5:10:100) for developing the ketose and disaccharide spots. Benzidine:glacial acetic acid:ethanol (0·5:20:80) was used to develop the aldose spots. Chromatogram strips are given for each month in the period September–March, and show fructose, sucrose, kestose and raffinose spots. The R_f values of these are, respectively, 0·26, 0·15, 0·11, and 0·09. Raffinose was found from December onwards but kestose was detected only from February.

Determination of salt traces in purified boiler feed water. S. ZAGRODZKI and H. ZAORSKA. *Gaz. Cukr.*, 1959, **61**, 268–271.—A spectrophotometric method of determining salt traces in boiler feed is described. For continuous control a sample of the feed is drawn off the main feed line and is fed by way of a regulator to an evaporator, heated by vapour from the main line. The concentrate passes to a spectrophotometer connected to an indicator. Accuracy is to within 2.10^{-7} N K, 2.10^{-6} N Na and 4.10^{-6} N Ca, the error not exceeding 2–5% with high salts contents. Automatic control is possible through electric impulses from the indicator to the valves, or a high salts content can be indicated by an alarm. The technique may be adapted to detect sugar traces in the feed water.

* * *

The rate of crystallization of sucrose in impure sugar solutions. I. A. MIRCEV and M. FRIML. *Listy Cukr.*, 1959, **75**, 255–257.—The rates of crystallization of sucrose from syrups, molasses and solutions of yellow sugar and mixtures of syrup and molasses were determined at 40°C. The crystallization rate of sucrose out of syrups of the same purity was the same over a supersaturation range of 1·07–1·19. Although the syrup-molasses mixtures had the same purity of 82, the crystallization rates varied considerably. Graphs presented of supersaturation coefficient *vs.* crystallization rate show that the curve for the syrups differs substantially from that for syrup-molasses mixtures. At low supersaturations, the crystallization rate from the solutions of low-grade sugar in thin juice were considerably lower than from syrups of the same purity.

* * *

Respiration rate and sugar loss. M. VAJNA-PAPP. *Zeitsch. Zuckerind.*, 1959, **84**, 565–569.—Methods of determining the respiration rate and sugar losses in beets are discussed and criticized, and a new method described, whereby four segments of approximately 26 g are cut longitudinally from quarters of a whole beet and four segments of similar size later cut from the cut surfaces of the quarters (which have undergone respiration). The average difference in sugar content is the loss due to respiration.

* * *

The measurement of filtrability and a method for design of a factory filter station. A. M. HERTZEBERG and C. B. MOUNTFORT. *Trans. Inst. Chem. Eng.*, 1959, **37**, 5–8; through *S.I.A.*, 1959, **21**, Abs. 689.—Considerations of the resistance to filtration have led to the derivation of equations which are used to determine the optimum conditions for filtration. The following assumptions are made: each filter is put on feed as soon as it has been cleaned; time of filling does not vary with throughput rate; filter cloths do not contribute to the resistance; filter cake resistance is independent of pressure. From the equations curves are derived which are used to determine the output; an example of the use of the curves is included.

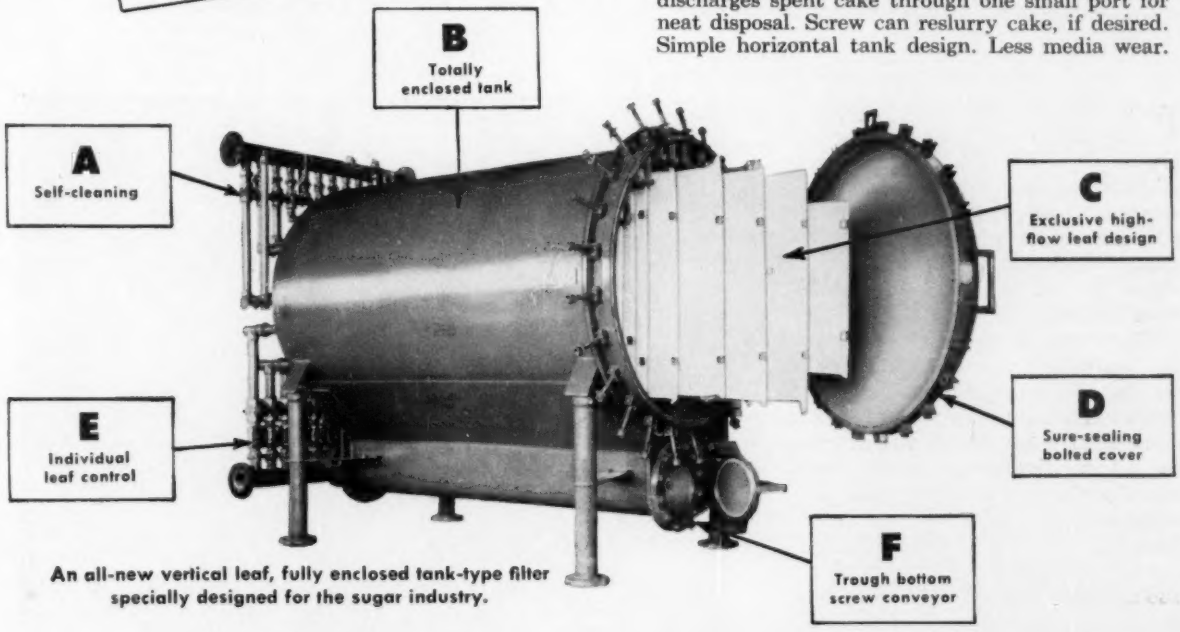
SPARKLER *Presents* NEW SUGAR FILTER MODEL RSC

EXCLUSIVE OPERATING ADVANTAGES

Greater Clarity Control—Sight glasses, sample cocks and individual control valves for each leaf provide continuous clarity control. Should any leaf not function properly, it may be shut off without interrupting operation.

Minimum Manpower Required—A single non-skilled individual is capable of operating a large battery of RSC filters including filter aid addition, cleaning, precoating and supervising.

Faster Cleaning, Easier Maintenance—A 560 sq. ft. Model RSC can be cleaned in 10-15 minutes (30-45 minutes total down-time). Leaves are sprayed clean individually. Screw conveyor in trough bottom discharges spent cake through one small port for neat disposal. Screw can reslurry cake, if desired. Simple horizontal tank design. Less media wear.



An all-new vertical leaf, fully enclosed tank-type filter specially designed for the sugar industry.

Exclusive Design Features

A Internal sprays sluice filter. Can be independently valved for individual operation under low pressure conditions.

B No leaking, dripping or air-borne contamination. Assures a neat filter station with clean, sanitary service. Filter may be insulated to minimize heat loss. Can be installed in low headroom, small floor space areas.

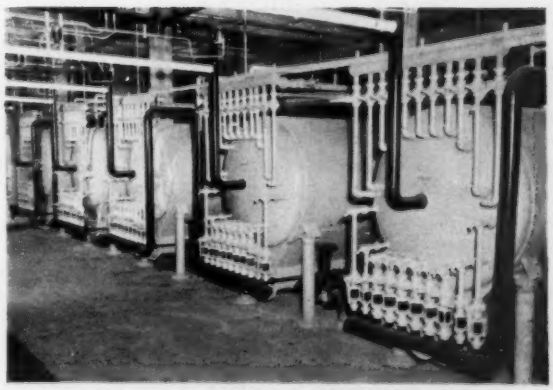
C Vertical rectangular leaf design assures maximum flow per filtering area and even precoating. Unexcelled rigidity and durability. Hung on roller carriages for easy individual inspection or removal, no bolts or fastenings. Self-sealing in filter. Stainless steel leaves covered with long-life synthetic cloth or stainless steel wire screens.

D Bolted cover on double-hung hinge provides full access to interior without leaf removal. Hydraulic quick-opening cover optional.

E Individual plate outlet control valves, sight glasses and sample cocks. Any plate or plates may be shut off without removing filter from service.

F Trough bottom with screw conveyor discharges cake neatly and quickly without opening tank. Cake can be reslurried if desired.

SIZES UP TO 1020 SQ. FT. OF FILTERING AREA



A battery of five 300 sq. ft. Model RSC filters in operation at Union Sugar Co., Betteravia, California, U.S.A.

Address all inquiries to Sugar Department

SPARKLER

MANUFACTURING CO., Mundelein, Illinois, U.S.A.

Sparkler International Ltd., Leliegracht 9, Amsterdam-C, Holland
Manufacturing plants in Canada, Holland, Italy and Australia

Filtration engineering and manufacturing exclusively for over 30 years

For the production of

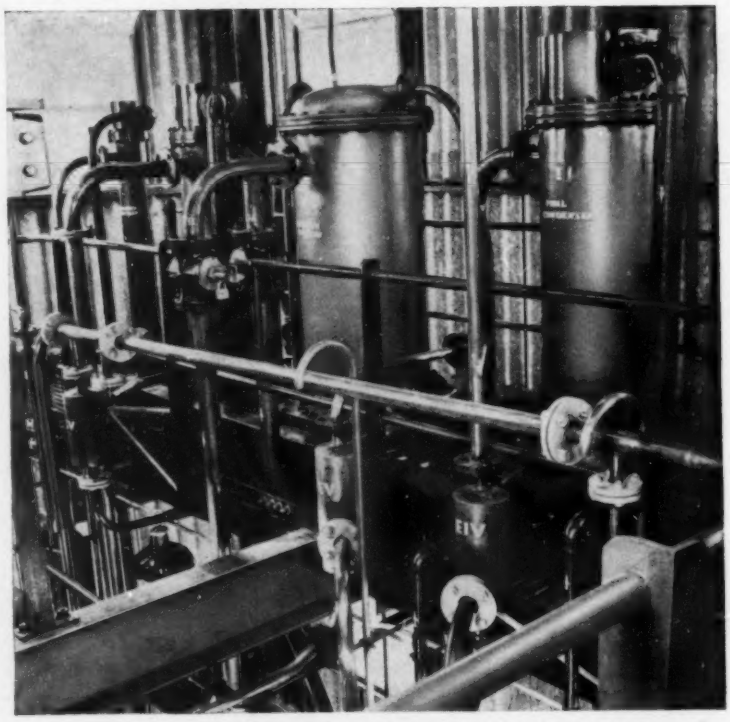
ALL TYPES OF ALCOHOL FROM YOUR MOLASSES

APV offer a complete Engineering Service

FOR ALCOHOL distillation projects, fermentation and yeast manufacturing plants, the APV Chemical Engineering Division offers a service embracing development, design, fabrication, construction and commissioning. This service extends from the building of complete plants to the provision of individual items of equipment.

Whether the raw material is molasses or rice, barley or dates, a distillation process can be offered to produce high quality alcohol with the maximum economy. As an example, an attractive distillation process has been developed which enables exceptionally fine rectified spirit to be obtained direct from molasses washes. Processes for the production of absolute alcohol with low steam consumption are also available, while another speciality is a system for the recovery of CO_2 from fermentation.

APV has had twenty-five years' experience in designing and building alcohol and yeast plants, and is served by extensive modern laboratories which make possible the thorough investigation of new materials and processes. These advantages are backed by the resources of a large, well equipped factory and by those of APV's associated companies overseas. Alcohol installations in all five continents bear witness to APV's experience in this field.



Plant for the production of highly rectified spirit direct from fermented molasses wash at Wray & Nephew Ltd., Appleton Sugar Estate, Jamaica, B.W.I.

APV

CHEMICAL ENGINEERING DIVISION

Contractors and engineers to the fermentation and alcohol distillation industries. Plants for grain cooking; saccharification; yeast culture; fermentation; CO_2 recovery; potable, industrial and rectified spirit; absolute alcohol; butyl alcohol; acetone, etc. Stills and other essential equipment for the manufacture of whisky, gin and rum.

THE A.P.V. COMPANY LIMITED · MANOR ROYAL · CRAWLEY · SUSSEX

TELEPHONE. CRAWLEY 1360 · TELEX: 8737 · TELEGRAMS: ANACLASTIC, CRAWLEY

BY-PRODUCTS

Viscose pulps from sugar cane bagasse. D. N. MITRA. *TAPPI*, 1959, **42**, 366–374; through *S.I.A.*, 1959, **21**, Abs. 644.—Bagasse, depithed by a dry process, was pulped to a viscose grade dissolving pulp by the sulphate process with relative ease, but a high pentosan content (18–20%) remained. Detailed tests of the usual sulphate process, an acid prehydrolysis on bagasse, and a two-stage process of prehydrolysis before sulphate pulping are reported. Variations of cooking time and temperature did not improve the pulp, but the pentosan content could be reduced to 4 to 6% by the two-stage process. With effective use of the by-product pith and of the furfural recoverable in the process, the pulp manufacture should be commercially feasible.

* * *

Final molasses and feed for cattle. A. MAY. *Bol. Azucar. Mexicano*, 1958, (Oct.), 21–22; through *S.I.A.*, 1959, **21**, Abs. 654.—Increasing use of molasses as cattle feed is urgently needed in Mexico, owing to the sharp decline in the use of molasses for industrial alcohol manufacture. Molasses may serve as a feed appetizer, and for mixing with concentrated commercial fodder. In Mexico the molasses should be mixed with fish meal as a protein-rich feed, and with bagasse pith, e.g. 100 kg of molasses + 100 kg of bagasse pith + 40 kg of fish meal. The nutritive coefficient of this feed, i.e.

$$\frac{\text{digestible protein content}}{\text{carbohydrates} + 2{\cdot}25 \times \text{fat content}},$$

should preferably be not less than 5. The molasses not only serves an an appetizer, but also increases the nutritive value of the feed.

* * *

Mycological formation of fat. VII. Formation of fat from molasses by *Aspergillus nidulans* and by *Penicillium soppii* in surface culture and in shaken culture. A. M. GAD, S. MURRAY and T. K. WALKER. *J. Sci. Food Agric.*, 1959, **10**, 597–603.—Experiments have been made with cane and with beet molasses as substrates for the cultivation of the fat-producing moulds *Aspergillus nidulans* and *Penicillium soppii*. Satisfactory yields of fat up to 16 g/litre on a cane molasses medium supplemented with salts and up to 11·8 g/litre on an unsupplemented beet molasses medium were obtained with *A. nidulans* in static culture, but in shaken cultures prepared with molasses media this mould produced little fat. In static and in shaken cultures prepared with sucrose-salts media *P. soppii* produced 21·6 g of fat/litre and 8·1 g of fat/litre respectively. In static cultures on supplemented and unsupplemented cane molasses media *P. soppii* produced about 18 g of fat/litre, while in static cultures on beet molasses media, whether fortified by salts or not, the yield was 22 g/litre. When *P. soppii* was grown in beet molasses media with agitation the highest yield of fat was 6·2 g/litre.

Enriching "Betfor" by protein. S. NORDFELDT. *Socker Handl.* II, 1959, **15**, 25–33.—Tests showed acceptable results were given on increasing the protein content of "Betfor" (molasses-beet pulp-carbonatation sludge) to 13·3–14·3% by adding peas and beans. A survey is made of the literature concerning increasing the protein content by "ammoniation" or addition of food yeast; where the production of the latter is recommended from economic and technical aspects it is preferable for feeding cattle.

* * *

New plant utilizes Cuban sugar by-product. ANON. *Sugar y Azúcar*, 1959, **54**, (12), 25–26.—A description is given of the bagasse board plant and process used at Cuban Bagasse Products S.A., Cruces, L.V., Cuba[1].

* * *

Secondary products of alcoholic fermentation; composition of fusel oils. L. GENEVOIS and J. BARAUD. *Ind. Alim. Agric.*, 1959, **76**, 837–844.—Recent work is surveyed with particular reference to the results obtained using gas chromatographic and radio-carbon tracer techniques.

* * *

Molasses as a raw material. K. XIEZOPOLSKI. *Gaz. Cukr.*, 1959, **61**, 342–344.—The treatment of molasses to obtain sugar, betaine, glutamic and itaconic acids is reviewed with 36 references to the literature.

* * *

Polymeric aldehydes in sugar cane cuticle wax. J. A. LAMBERTON and A. H. REDCLIFFE. *Chem. and Ind.*, 1959, 1627–1628.—On heating cane wax under saponification conditions, a large fraction is found to be non-distilling in a molecular still. That this insoluble material is a mixture of artefacts is shown by the fact that approximately 90% of the wax itself will distill at between 220–235°C at 0·5 mm Hg. The distillate consists of about 50% long-chain (C_{30}) aldehydes, about 30% long-chain (C_{30}) alcohols, about 10% acids, and a small proportion of hydrocarbons, etc. It is thought likely that the aldehydes are formed by depolymerization of an aldehyde polymer of the trioxane type.

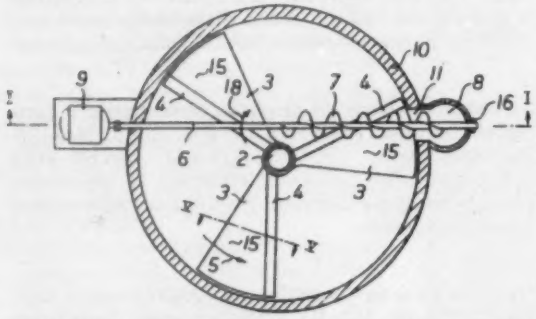
* * *

Liquid feed with alcohol. ANON. *J. Agric. Food Chem.*, 1959, **6**, 261–263.—Tests with "Morea," a feed supplement containing 67% molasses, 10% urea, 6% ethanol, 3% phosphoric acid, 4% trace minerals and vitamins, and 10% water, have proved successful. A 17% increase in the body weight of sheep and of 15–25% in weight of beef cattle was effected (compared with standard rations) and a butterfat increase of 8% in dairy cattle milk was obtained. The supplement is a free choice diet, being normally added to grain or cellulose containing roughage.

[1] *See also I.S.J.*, 1959, **61**, 285.

UNITED KINGDOM

Removing pulp from treatment (beet diffusion) towers. M. J. JALKANEN, of Rauma, Finland. **826,518.** 25th April 1957; 13th January 1960.—Sugar beet cossettes reach the top of the tower 10 as exhausted pulp. This is loosened by the action of blades 3 which are attached to and rotate with the central



shaft 2 in the direction of arrow 5. The leading edges 4 of the blades are wedge-shaped and raise a layer of pulp on to the horizontal surface 15. A screw 7 mounted on the shaft 6 driven by motor 9 rotates in the direction of arrow 18. The clearance between the screw circumference and the horizontal surface 15 is of the order of 5–10 mm so that the pulp carried on this surface is transported by the screw to the exit port 11 and the pulp discharge pipe 8. The screw conveyor may be replaced by an endless belt conveyor carrying rakes and driven by a motorised pulley so as to scrape the pulp off the blade surface into the discharge pipe.

* * *

Beet harvester. A. M. JONGENEEL, of Rio Vista, Calif., U.S.A. **827,686.** 4th September 1958; 10th February 1960.

* * *

Crushing mills. DUNCAN STEWART & CO. LTD., of Glasgow C.3, Scotland. **828,450.** 17th October 1956; 17th February 1960.—In order to obtain more power for a cane mill the steam engine drive is replaced by a steam turbine while, in order to take up no more space than the engine, the turbine is mounted with its shaft at right-angles to the mill shafts. The reduction gearing from the turbine is mounted in a casing and incorporates a right-angle drive such as a bevel gear with teeth of hypoid form whereby the output shaft emerges from the casing at approximately the same position and the same speed of rotation as the crankshaft of the engine which is replaced.

* * *

UNITED STATES

Ruminant feed. M. B. GILLIS, of Glenview, Ill., assr. INTERNATIONAL MINERALS & CHEMICAL CORP. *Reissue* **24,707** (Originally **2,758,057**). 31st July 1958; 29th September 1959.—The feed contains 0·1—25% by weight of an end-liquor produced by hydrolysing glutamic acid mother substances obtained from sugar beets and from which part of the glutamic acid has been removed, *this end-liquor having a pH of 2·5—4.* (Italics indicate an amendment in the reissue.)

* * *

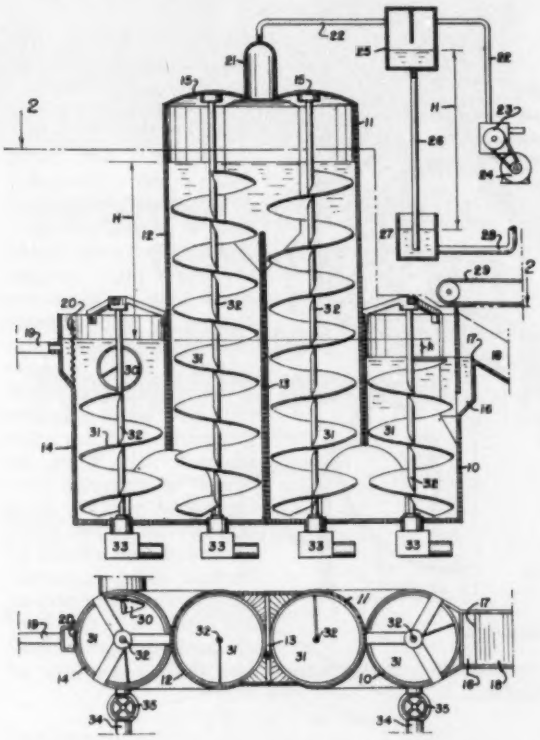
Process for separating (bagasse) pith from fibre. W. J. NOLAN, of Gainesville, Fla. **2,905,973.** 16th April 1956; 29th September 1959.—A mixture of small pith particles and long cellulose fibres and fibre bundles is continuously fed onto one end of a continuously moving horizontal 10–20 mesh screen, preferably in the form of an endless conveyor belt, to form a mat of $\frac{1}{8}$–$1\frac{1}{2}$ inches depth. A body of water at least as deep as the mat is maintained above the upper surface of the screen so that the fibres and fibre bundles are supported in a loosely interwoven condition so as to be capable of limited movement with respect to each other. The screen and mat are continuously moved horizontally, bringing successive portions of the mat beneath a number of closely adjacent longitudinally and transversely spaced water streams directed vertically downward against the mat with sufficient force to hold the fibres against the screen and to dislodge the pith mixed with or adhering to the fibres. The streams also contact the mat with a small horizontal force so that they roll the fibres about their longitudinal axes and their whole surface is consequently washed. The water and suspended pith drain through the screen, the rate of the streams and water removal being such as to maintain the body of water above the screen.

* * *

Continuous sub-atmospheric diffusion of sugar. J. P. RUTH, of Denver, Colo., U.S.A. **2,908,596.** 7th May 1956; 13th October 1959.—The body of the diffuser comprises two open-topped wells 10, 14 connected at their bottom ends with towers 11, 12 themselves connected at the top (over the baffle 13) and closed

Copies of Specifications of United Kingdom Patents can be obtained on application to H.M. Patent Office, 25 Southampton Buildings, London, W.C.2. (price 3s. 6d. each). United States patent specifications are obtainable from: The Commissioner of Patents, Washington, D.C. (price 25 cents each).

by the caps 15. Water is admitted to well 14 through pipe 19 and screen 20 and passes through to be withdrawn as raw juice through channel 18 by way of baffle 16 and weir 17. The caps 15 are provided with a bell 21, connected by way of water vapour trap 25 to a vacuum pump 23 so that the pressure may be reduced in the top of the towers and the liquid level



drawn up over baffle 13 to permit flow through the diffuser. The reduced pressure continuously de-aerates the liquid passing through. Beet cossettes delivered by conveyor 29 are carried down the well 10, up tower 11, down tower 12 and up well 14 by the scrolls 31, driven individually or together as desired, and when exhausted, the pulp is withdrawn by means of the screw conveyor 30. Drains 34, controlled by valves 35, are provided at the bottom of the wells for emptying the unit.

* * *

Esters of 2-hydroxypropyl sucrose. A. W. ANDERSON and J. L. MELSTAD, assrs. DOW CHEMICAL CO., of Midland, Mich., U.S.A. **2,908,681.** 25th February 1957; 13th October 1959.—Acyl esters of octakis–(2–hydroxypropyl)–sucrose, useful as wetting and emulsifying agents, detergent or antifoam agents, plasticizers, polymer intermediates, surface coating chemicals, modifiers of resins, etc., contain 1–8 saturated or olefinic acyl radicals containing 1–18 carbon atoms attached to an octakis–(2–hydroxypropyl)–sucrose residue. The radicals may be of acetic, lauric, stearic, oleic or linoleic acids.

* * *

Recovery of glutamic acid (from Steffen's filtrate). F. A. HOGLAN, of Glenview, Ill., assr. INTERNATIONAL MINERALS & CHEMICAL CORP. **2,909,564.** 29th November 1956; 20th October 1959.—A portion of Steffen's filtrate is hydrolysed by heating with a non-oxidising acid at pH below 1 (0) and at 100–125°C (125°C) for ¼–4 hr (2 hr). It is concentrated under these conditions to 60–85% solids and divided into two fractions. One fraction (A) comprising 20–80% (30–70%) of the whole has the insoluble material removed, the remaining fraction (B) containing all the original insolubles. Another portion of Steffen's filtrate is hydrolysed under alkaline conditions (with NaOH) and mixed with sufficient of fraction B to give a pH of 4–6 (4·5—5·5); the insolubles are removed and the liquor concentrated to 65–85% (80%) solids and inorganic salts crystallized and removed. The resulting liquid is mixed with sufficient of fraction A to give a pH of 3·2 and glutamic acid crystallized.

* * *

Animal feed. E. C. KUNZ, of Arden, N.C. **2,910,361.** 3rd April 1959; 27th October 1959.—A completely liquid feed consists essentially of an intimate mixture of molasses with 3–4% of urea, the composition being completely free of natural grain feeds.

* * *

Brown sugar. A. LACHMANN, assr. THE AMERICAN SUGAR REFINING CO., of New York, N.Y., U.S.A. (A – B) **2,910,386–7.** 13th March 1956; 27th October 1959. (C) **2,910,388.** 14th March 1956; 27th October 1959. (D) **2,910,389.** 2nd October 1955; 27th October 1959.

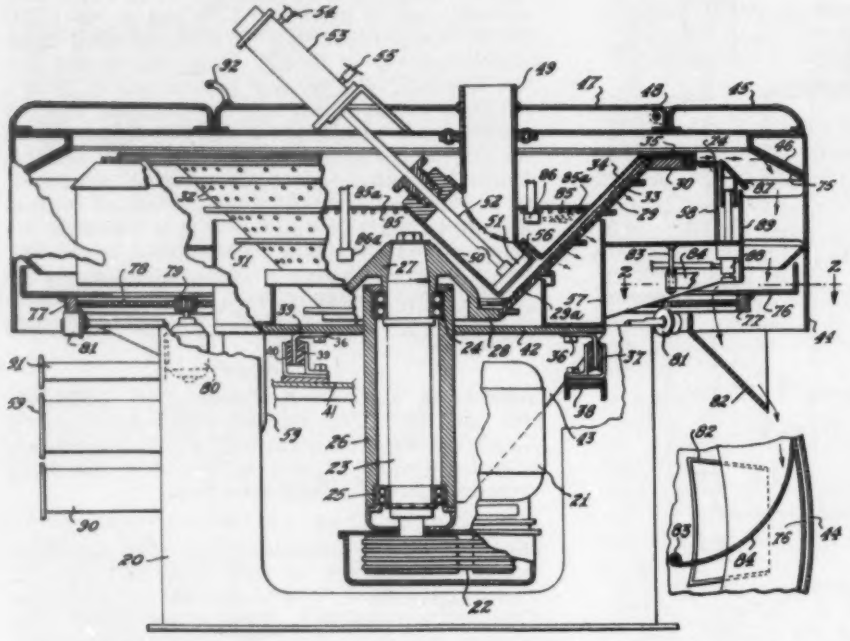
(A) Granular brown sugar having a molasses layer on the crystals is converted into a free-flowing dry granular brown sugar product by partially drying and adding and coating the molasses layer with 1–10% of a relatively non-hygroscopic edible powder (starch or powdered sugar), drying with agitation to less than 1% moisture at an elevated temperature, cooling with agitation to below 80–90°F, and pulverising. Alternatively the coating may be added between the dryer and the cooler.

(B) Granular moist brown sugar with a molasses layer on the crystals is dried at a temperature above 60°C, with agitation, until the moisture content is below 1%, and the resultant product cooled to below about 90°F.

(C) Granular moist brown sugar dried to less than about 1·5% moisture is sprayed with a 6–10% sucrose solution, to the extent of 3·3–20% of added sucrose by weight of brown sugar. The coated sugar is dried at an elevated temperature, with agitation, to less than 1% moisture, and cooled to below about 90°F, also with agitation.

(D) Granular moist brown sugar is dried with hot air to below 1% moisture and pulverised.

Centrifugal separator. P. P. STRICH, of Cincinnati, Ohio, U.S.A. **2,910,184.** 30th September 1957; 27th October 1959.—An inverted frustro-conical basket 29 is supported on the flange 28 fitted to a rotor shaft 27 driven by belts 22 from motor 21. The frame and shaft housing 26 are fitted to a base plate 42 supported on rubber mountings 37, 39. The basket



is imperforate for some way and then is provided with evenly-spaced perforations 32. It is also provided with strengthening rings 31. Inside the basket is a screen 33 while inside this is another frustro-conical section 34 fitted with a flange 35 close to the flange 30 at the upper end of basket 29. Massecuite enters through conduit 49, its rate of feed being determined by the action of the reciprocating plunger valve 51 so that a thin layer of about $\frac{1}{8}$–$\frac{3}{8}$ inch forms on the screen and is carried upwards and outwards by centrifugal force. The mother liquor spun off through screen 33 and perforations 32 passes into the chambers 57, 58 and out of the machine by conduit 59. The sugar reaching the top of the basket passes out through the gap between flanges 30 and 35 which, however, is partly closed by a series of adjustable triangular wedges so arranged that adjustment of their position modifies the free space between them for the free passage of crystals and so alters the retention time in the basket. The crystals passing through strike the rubber deflector plates 75 and drop to a rotating channel 76 driven by motor 80 through the pinion 79 and internal gearing 78 on the flange 77 below the channel and supported by rollers 81. A curved scraper blade 84 fastened to rod 83 collects the sugar and delivers it into chute 82. When it is desired to wash the material in the basket, water is supplied through nozzles 86 and is trapped by flange 85*a* and so forced through perforations 85 onto the bed. When it is desired to wash the cone and basket, water is supplied through nozzle 86*a*, annular baffle 87 being raised to prevent water passing through the sugar opening to the channel 76.

* * *

Sugar purification with ion exchangers. W. A. BLANN, assr. AMERICAN CYANAMID CO., of New York, N.Y., U.S.A. **2,911,329.** 10th April 1953; 3rd November 1959.—Raw cane or beet juice is passed through a hydroxyl-activated anion exchanger prior to treatment with a cation exchanger and thence through a system comprising a series of pairs of ion exchangers, one of each pair being a hydrogen zeolite and the other of each pair being an anion exchanger, continuing to pass the juice through the system while the pH of the influent to the final anion exchanger is higher than 2·9, contains less than 12 meq/litre of acid as determined by titration, and contains less than 1 meq/litre of cations.

* * *

Making bagasse pulp. D. S. CUSI, assr. INTERNATIONAL PULP PRODUCTS INC., of Washington, D.C., U.S.A. **2,913,362.** 14th June 1954; 17th November 1959.—A substantially homogeneous pulp is obtained by mechanically separating substantially all the cane parenchymatous tissue while leaving a residue composed of a heterogeneous mixture of substantially all the original fibrovascular bundles and almost all the peripheral sclerenchyma. The residue is formed into a suspension in liquid of 5–15% solids content, and digested with alkali at a predetermined temperature to effect pulping, but not degradation, of the fibrovascular bundles and to soften the sclerenchyma. The latter is thereafter separated from the pulp and digested to form a separate sclerenchyma pulp.

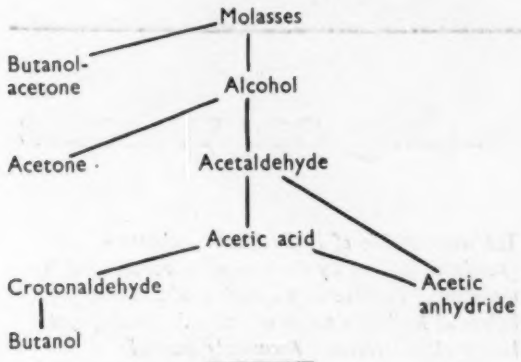
* * *

Beet pulp press. E. V. JUNG, assr. A. B. LANDSVERK, of Landskrona, Sweden. **2,912,923.** 12th March 1958; 17th November 1959.—See U.K.P. 803,216[1].

[1] *I.S.J.*, 1959, **61**, 60.

IMPROVED DISTILLATION EQUIPMENT

FERMENTATION AND BYPRODUCTS INDUSTRIES



Ancillary industries :
Yeast and glucose manufacture

Planning
Projects and Engineering
Construction
Erection
Initial operation

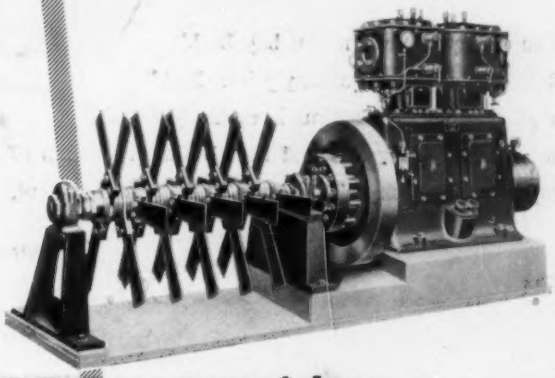
SPEICHIM

Société pour l'Equipement des Industries Chimiques

14 rue la Boétie

PARIS 8 ème — FRANCE

PARKER Steam Engines



provide economical power for the Sugar Industry

In factories and refineries throughout the world PARKER steam engines are providing reliable power from process steam at negligible cost. Simple and efficient in design, Parker engines require little maintenance and can be operated by unskilled labour Unlike turbines Parker engines can be direct coupled without the use of costly reduction gearing and variable speed over side limits can be obtained without complicated control equipment.

Built in sizes from 10 to 1,000 b.h.p. PARKER engines are all constructed to give long life with top economy under the most severe operating conditions.

Write now for full specifications and applications to:

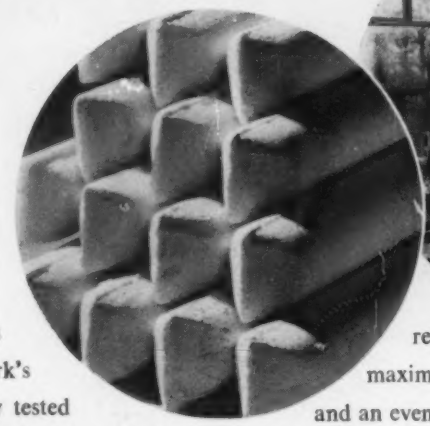
ASHWORTH & PARKER LTD

RIVERSIDE WORKS · BURY · LANCS.

Berk's Roll Sulphur

TESTED FOR UNIFORMITY

The mark that guarantees the product all over the world.



You buy quality when you buy Berk's Roll Sulphur—at a quantity price. Berk's bright yellow Roll Sulphur is regularly tested in modern laboratories and the absolute minimum of impurity is present. The ash content is non-existent, resulting in total combustibility and maximum conversion to sulphur dioxide, and an even purification of your juice. Write to us now and we will reply by return giving you shipping details and prices. It pays to buy your sulphur from Berk!

Overseas enquiries to

F. W. BERK & CO. Ltd. Dept. HCS/SJ, **STRATFORD, LONDON, E.15**

Cables: Berk London Telex 23796

THRO' THE MILL—ON PENNINE CHAIN

Running on wheels

ARM WHEEL SPROCKET

SOLID CENTRE SPROCKET

The wearing life of malleable iron chains is greatly influenced by the type of sprockets used in the drive. Pennine cast sprocket wheels are balanced in design to ensure smooth running and longer chain service. Accurately pitched sprocket teeth are ground to fit each chain correctly. Precision-bored hubs with true keyways facilitate easy fitting.

In addition to the three standard patterns—arm wheel, solid and split centre sprockets—other patterns can be furnished to suit specific needs.

Pennine wheels

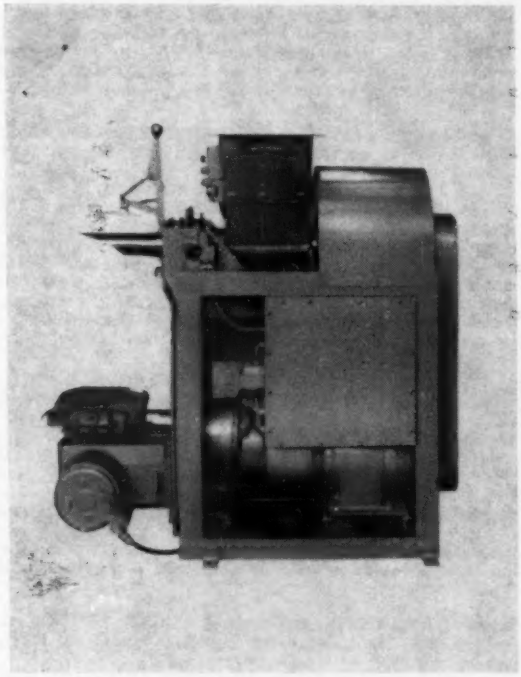
Catalogues on request: PENNINE CHAINBELT CO. LTD., ARMLEY, LEEDS 12, ENGLAND

TRADE NOTICES

Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

Weigher and bag-filler. Richardson Scale Co. Ltd., Albert Street, Bulwell, Nottingham.

The new combined weigher and valve bag filling machine illustrated can fill 2–3 bags per minute and can incorporate a bag settling device. An agitator is



incorporated within the feed inlet so that material will not arch. It is particularly suited to handle powdery materials.

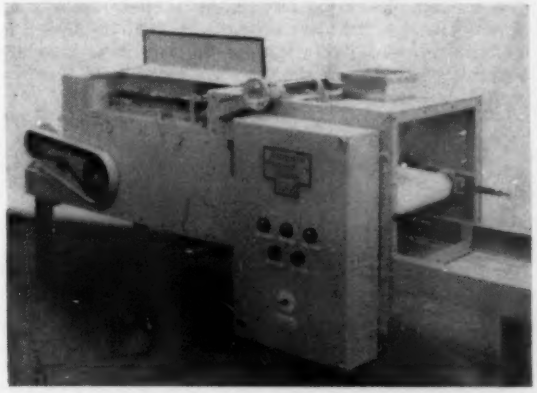
* * *

The "Minican" Temperature Recorder. Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London S.W.1.

The "Minican" instrument has a height of 4½ in plus a 2 in temperature sensing bulb, with a diameter of 2¾ in and a weight of 1½ lb. It includes a drum-mounted chart on which a pen traces a temperature record for 2, 12 or 24 hours determined by the built-in mechanical clock. In use both chart and pen are completely enclosed in a chromium plated brass cylinder which is liquid and gas proof and capable of withstanding high cooking pressures. Accuracy is to 0·5 mm on the chart width of 40 mm and the minimum range is 50° across the chart.

Continuous "Feedometer". Adequate Weighers Ltd., Bridge Works, Bridge Rd., Sutton, Surrey.

A new electrically operated "Feedometer" permits continuous process feeding or the continuous blending of materials. Sensing of the weigh system is accomplished by intrinsically safe electronic relay systems which feed two adjustable timing units and provide electrical interlocks in additional to those mechanically operated. The timing units operate the reversing



contactor for the feed control motor which is driven intermittently until the weight error is satisfied by a suitable correction to the feed. This prevents continual hunting of the weighing system. Additional switches and relays stop the feeder in case of feed failure or flooding and also if the automatic feed control expires in either direction. Visible signals are given and contacts are provided for audible alarms. The accuracy varies with the output and nature of the material handled but an average working figure is in the order of ± 1% over a 2 minute period. The complete machine can be totally enclosed for dust protection, and it is possible to provide remote control by electronic or pneumatic means.

* * *

Automatic weigher for conveyed material. Electro-weighers Ltd., Moseley St., Birmingham 12.

A dust-proof load cell is incorporated in a single belt conveyor idler weighbridge. The weight of material on the belt creates a pressure on the cell; this is electrically connected to a stable oscillator which induces a voltage which, when amplified, gives a direct reading of the momentary load. An additional voltage from a tachogenerator driven on the return belt is multiplied and integrated with the oscillator voltage to give a highly accurate indication of the total material conveyed, over a range of 20–20,000 tons per hour.

Automatic control of bin level. Stephens-Adamson Mfg. Co., Ridgeway Avenue, Aurora, Ill, U.S.A.

The three automatic "Tellevel" bin level controls include normal duty, explosion-proof and heavy duty. Each is a self contained unit with a pendant float, which operates a sensitive enclosed switch. The units are mounted in bins or tanks to regulate level of bulk materials. As the material level rises or falls, the "Tellevel" Control can be installed to operate warning lights or horns. Automatic control or signals systems can be arranged by installing one or more "Tellevel" Controls near the top, bottom, or at various levels in a bin or tank in which bulk materials are stored.

Ordinarily, the "Tellevel" Control is connected for a normally-closed circuit, but can be connected for normally-open circuit just as easily. Using a normally-closed operation as an example: a rising level of material will tilt the "Tellevel" float ball, the switch will shut off the current, and stop the feed-conveyor, elevator or pump. When the level falls, the float returns to vertical position, the switch closes and feed is resumed. The unit needs no lubrication or other maintenance.

* * *

PUBLICATIONS RECEIVED

CROFTS FREE SPACE HYDRAULIC COUPLINGS AND DRIVES. Crofts (Engineers) Ltd., Thornbury, Bradford 3, Yorks.

Publication 5951 provides power tables and dimensions for the FSP pulley-type drives and type FSC couplings which, running at full speed, are of about 95% efficiency. They are available from stock up to 100 h.p. at 1450 r.p.m. and are also available for powers up to 700 h.p. They permit the use of cheaper, smaller motors and starters and give stall-proof cushioned drives which lengthen machinery life.

* * *

KENYON DRIVES. William Kenyon & Sons Ltd., Dukinfield, Cheshire.

New leaflets describe the Ampulco "Shaft-King" and "Screw-King" drives made under licence from their U.S. originators The "Shaft-King" speed-reducing drives are in three sizes from ½ to 12 h.p. in ratios of 13:1 and 20:1 and since they are direct-mounted on the driven shaft they economise on floor space, their connexion via V-belt or "Power Grip" drive also affording flexibility. The "Screw-King" drives are speed reduction units with a trough-end adaptor on the low speed side which bolts directly to the trough end of a screw conveyor. Selection data are given for various input and output speeds, motor horse-powers, dimensions, etc.

* * *

ELECTRICALLY-DRIVEN CENTRIFUGALS. Pott, Cassels & Williamson Ltd., Java St., Motherwell, Scotland.

The well-known electrically-driven Pott, Cassels & Williamson centrifugal described in a new booklet is fitted with a motor designed to dissipate the heat developed in operation, in many cases eliminating the need for fan cooling. Its insulation for use in tropical or humid conditions is such that it is possible to hose the winding with steam without damage. An emergency mechanical brake is fitted but regenerative braking is normally used to cut the speed to that used for ploughing. The robust suspension head is provided with rubber buffers to control oscillation while the spindle is in two parts to permit removal of the basket and casing without disturbing the bearings or motor. The claw-type flexible coupling is provided with renewable steel buttons to take the drive which run in an oil spray while the ball and roller bearings run in oil. The dynamically-balanced basket is a taper fit on the shaft and has reinforcing steel hoops. The outer casing is fitted with a steam chamber and steam valve for cleaning. A number of systems of timers, contactors, relays and interlocks is available to provide anything from individual press-button control to fully automatic operation. Similarly, ploughs of various types are designed for manual operation, manually controlled power operation and automatic operation; there are mixer valves for manually controlled power operation and automatic operation; visual, hand-set automatic and completely automatic basket capacity controllers; basket discharge valves, and water washing and steaming equipment. An alternative to the basket valve is the exclusive Pott, Cassels & Williamson charging cone.

* * *

MIRRLEES ENTRAINMENT PREVENTION. The Mirrlees Watson Co. Ltd., 45 Scotland Street, Glasgow C.5., Scotland,

A new leaflet describes the principles and performance of wire mesh enfrainment screens knitted of stainless steel or monel metal wire and mounted as 6 inches thick units in frames of the same metal. Impingement area is approximately 100 sq. ft. per cu. ft. and free volume 97–98%, while entrainment separation efficiency is 99·9% for velocities of 6–12 f.p.s. through a 4-inch screen, the particle size being less than 30 microns.

* * *

LINK-BELT SCREW CONVEYORS AND SCREW FEEDERS. Link-Belt Company, Prudential Plaza, Chicago 1, Ill., U.S.A.

Book 2989, a new 76-page bulletin, carries many illustrations of Link-Belt screw conveyors and feeders in a variety of applications as well as descriptive data on over 20 different types of screw, 14 types of trough with 4 types of cover, 5 types of discharge openings, and two types of feeders. A table of typical bulk materials gives the appropriate class of conveyor required, while details of capacities and speeds, component groups, conveyor lengths and h.p. factors, dimensions, atc. are presented in tables occupying more than half the book.

* * *

ELECTROLYTIC CONDUCTIVITY EQUIPMENT. Electronic Switchgear (London) Ltd., Works Rd., Letchworth, Herts.

Two new leaflets cover conductivity measuring cells and a conductivity controller. The first provides information on the "Flowline" Series CCA, immersion Series CCB, open tank Series CCF/10 and Series CCM, insertion Series CCR and sampling cell Series CCL. The second describes modifications of the type RC4 conductivity controller which provides an alarm signal as well as automatic correcting action when the conductivity measured in a sample cell varies outside the required range.

* * *

STEEL BAND CONVEYORS FOR SUGAR PRODUCTS. Sandvik Steel Band Conveyors Ltd., Dawlish Road Works, Birmingham 29.

Sandvik carbon- or stainless-steel bands are available both flat and troughed, and are used widely in sugar factories and refineries for the conveying of ashes, beets, cossettes, pulp, raw and refined sugar, press cake, filled sacks, etc. They can be arranged in table assemblies, when rubber guides are bonded to their under surfaces, and can also be combined with cooling sections to lower the temperature of materials on the band. They can also be provided with a rubber belt surfaces, and have the advantages that they will not stretch, have a long life, low power consumption, are smooth running and have a hard dense surface.

* * *

ZEISS OPTICAL INSTRUMENTS FOR THE SUGAR INDUSTRY. Carl Zeiss, Oberkochen/Württemburg, Germany; Degenhardt & Co. Ltd., 6 Cavendish Square, London W.1.

A new series of leaflets are available describing and illustrating a number of pieces of equipment of particular interest in the sugar laboratory. These include a sugar polarimeter reading to 0·05°S, as well as polarimeters reading to 0·01° angular, 0·05° on a circular scale and a photo-electric precision instrument reading to 0·005° angular, and a percentage polarimeter for direct examination of juices with an accuracy of 0·1%. Other leaflets describe the Zeiss "Elko" electrophotometers, the PMQ II spectrophotometer, dipping and Abbé-type refractometers, and the PF 5 flame photometer for determination of sodium, potassium and calcium.

UNITED KINGDOM SUGAR IMPORTS AND EXPORTS[1]

IMPORTS

	1959	1958	1938	1913
REFINED	*Tons*	*Tons*	*Tons*	*Tons*
France	2,434	—	—	26,570
Czechoslovakia	23,601	12,942	16,123	†198,064
Holland	36	11	3,489	178,567
Belgium	1,917	2,273	1,255	49,764
Germany (West)	2,811	386	296	465,453
Poland	36,429	11,803	494	—
Eire	12,665	3,437	—	—
U.S.A.	19	30	14,720	385
Canada	2	1	9	—
Indonesia	—	—	358	—
Kenya	—	—	100	—
Uganda	—	—	200	—
Others	*30,960	524	76	3,742
	110,874	31,407	37,120	922,545
RAWS—BEET				
Poland	—	—	16,798	—
Germany	—	—	8,245	472,026
Czechoslovakia	—	—	1,330	†160,858
Holland	—	—	6,555	11,208
Denmark	—	—	20,925	—
Belgium	—	—	2,130	2,466
France	—	—	—	18
Other Europe	—	—	—	36,154
Total Beet	—	—	55,983	682,730
CANE				
Cuba	332,926	494,207	601,212	224,227
Dominican Rep.	256,297	349,310	271,345	9,412
Peru	54,700	45,419	61,753	27,487
Indonesia	—	—	143,496	99
Brazil	119,240	42,290	—	5,133
Venezuela	—	—	760	—
Mozambique	—	—	1,150	—
Mexico	9,464	—	—	4,134
Haiti	—	—	18,534	—
Dutch Guiana	—	—	529	4,606
India	1	—	—	3,850
Taiwan	—	9	—	—
U.S.A.	—	—	15,715	—
Mauritius	378,075	390,406	282,244	20,075
B.W.I.	533,121	518,955	174,626	47,736
Br. Guiana	168,379	204,130	54,891	
South Africa	199,116	170,200	214,566	—
Australia	270,684	333,216	380,579	—
Fiji	104,852	83,679	76,753	—
Kenya	—	—	4,425	—
Uganda	—	—	5,693	—
Tanganyika	—	—	4,540	—
Others	—	—	64	17,226
Total Cane	2,426,855	2,631,821	2,312,875	363,985
Total Raws	2,426,855	2,631,821	2,368,858	1,046,715

EXPORTS

	1959	1958	1938	1913
	Tons	*Tons*	*Tons*	*Tons*
Germany	4,698	6,145	1,288	
Holland	19,203	32,255	2,422	3,389
Belgium	4,521	2,777	669	
Denmark	6	10	537	4,407
Norway	38,373	29,163	56,641	
Finland	3	—	52,831	
Sweden	89	252	—	
Portugal	1	—	—	—
Switzerland	29,506	54,117	42,476	
France	531	261	307	
Greece	653	370	18,248	
Turkey	986	8	6,876	
Italy	946	3,853	2,323	
Yugoslavia	78	2,405	—	
Estonia	—	—	22,162	
Iceland	16	47	4,930	
Faroe Islands	—	622	—	
Eire	92	72	32,414	
Egypt	1	—	887	
Sudan	—	6	—	
Iraq	74,888	90,096	3,118	
Iran	394	75	237	
Israel	431	352	492	
Saudi Arabia	30,202	26,379	149	
Muscat & Oman	77	777	—	
Syria	—	—	63	
Lebanon	2,239	1,429		
Morocco	75	237	1,028	
Libya	1,155	7,123	—	
Tunis	23,453	32,674	—	
Ethiopia	50	198	—	
Uruguay	—	—	44,746	
U.S.A.	443	561	1,331	
Other Foreign Countries	11,815	6,529	6,411	
Total Foreign	244,925	298,793	302,586	?
Channel Islands	‡	‡	3,066	138
Gibraltar	2,766	2,358	1,058	
Malta/Gozo	3,222	2,122	5,538	
Cyprus	11,903	14,261	3,213	
Aden	855	831	1,515	
Malaya/Singapore	76,400	75,624	25,369	
Hong Kong	1	1	—	
South Africa	84	46	—	
Ceylon	842	873	100	
India	7	6	195	
Pakistan	25	7	21	
Falkland Islands	142	103	101	2,720
Canada	11	11	7,417	
Br. West Africa	100,931	93,951	—	
Bahrein, Kuwait, etc.	33,443	25,241	—	
Bermuda	416	1,347	1,723	
B.W.I./Bahamas	6,788	7,856	4,873	
New Zealand	—	1	—	
Br. East Africa	47,317	27,253	—	
Somaliland Prot.	8,500	6,753	—	
Other British Countries	926	4,314	5,286	
Total British	294,579	262,959	59,475	?
Grand Total	539,504	561,752	362,061	23,270
Total Re-exports, Raw and Refined Sugar			808	4,648

[1] C. Czarnikow Ltd., *Sugar Review*, 1960, (444), 39.

* Including 18,850 tons from Mexico, 7,765 tons from Germany (East), 2,284 tons from China and 2,058 tons from the Dominican Republic.

† Austria/Hungary.

‡ Shipments of sugar to Channel Islands no longer counted as an export.

BREVITIES

Ceylon sugar expansion prospect[1].—Services of a consultant are being sought by Ceylon's Department of Industries for a project involving the construction of two sugar factories, each to be under separate ownership, and producing 20,000 tons and 30,000 tons of white sugar per year. Advice of a consultant is required by the Government to ascertain the economic feasibility of certain byproducts, and duties would be preparation of a project report, tender documents, specifications, advice on acceptance of tenders, supervision of factory construction, staff training and commission of the plant.

* * *

Philippines sugar production[2].—The 1958/59 season closed early in November last when 1,512,173 short tons of sugar, equivalent to 1,350,154 long tons, were produced from an area of 195,691 hectares. Export commitments amounted to 1,316,635 short tons, leaving an apparent surplus of 195,000 short tons. The cane area for the 1959/60 crop is larger by some 8000 hectares than that of the previous season and it is estimated that about 1,552,000 short tons of sugar will be produced.

* * *

Broadbent centrifugals for Russia.—Centrifugals and auxiliary equipment for the two sugar factories to be supplied to the U.S.S.R.[3] will be made by Thomas Broadbent & Sons Ltd., of Huddersfield. The order will include a total of sixty machines which between them will treat 1400 tons of sugar per day.

Stock Exchange Quotations

CLOSING MIDDLE

London Stocks (*at 22nd March*, 1960)

Anglo-Ceylon (5s)	18/10½
Antigua Sugar Factory (£1)	17/6
Booker Bros. (10s)	32/3
British Sugar Corp. Ltd. (£1)	24/3
Caroni Ord. (2s)	4/3
Caroni 6% Cum. Pref. (£1)	18/–
Distillers Co. Ltd. (6s. 8d. units)	36/10½
Gledhow Chaka's Kraal (£1)	62/–
Hulett & Sons (£1)	75/–
Jamaica Sugar Estates Ltd. (5s units)	9/6
Leach's Argentine (10s units)	16/–
Reynolds Bros. (£1)	59/–
St. Kitts (London) Ltd. (£1)	18/9
Ste. Madeleine (Ord.) (£1)	28/6
Sena Sugar Estates Ltd. (10s)	20/–
Tate & Lyle Ltd. (£1)	60/6
Tate & Lyle Investments Ltd. (5s)	13/4½
Trinidad Sugar (5s stock units)	29/3
United Molasses (10s stock units)	42/9
West Indies Sugar Co. Ltd. (£1)	19/3

CLOSING MIDDLE

New York Stocks (*at 18th March*, 1960)

	$
American Crystal ($10)	38¼
Amer. Sugar Ref. Co. ($100)	27
Central Aguirre ($5)	22¼
Cuban American ($10)	14⅜
Great Western Sugar Co.	28⅜
South P.R. Sugar Co.	16½
United Fruit Co.	23⅝
West Indies Sugar Corp. ($1)	13

Uganda sugar production record[4].—Uganda's sugar production last year set up a new record of 81,075 tons compared with 80,889 tons in 1958. Consumption was also a record at 63,882 tons, 5% over the 1958 figure.

* * *

Roumanian beet crop, 1959[5].—The Roumanian Minister of Agriculture has stated that the sugar beet crop in 1959 was 2 million tons higher than in 1958, reaching 3·7 million tons. Only 3 million tons will, however, be processed into sugar.

* * *

Sugar factories for Ecuador[6].—It is planned by S. A. Ingenio de Azucar Imbabura to erect two sugar factories in the Chota and Salinas valleys, both in the Province of Imbabura.

* * *

New Bulgarian sugar factories[7].—A new sugar factory with a capacity of 25,000–27,000 tons of white sugar per year has been completed in Lom, Bulgaria, the equipment having been supplied by East Germany. A new factory, with a daily slicing capacity of 2000 tons of beet, is to be built near Warna, by 1961. Of the equipment, 65% will be produced in Bulgaria, the remainder coming from East Germany and Czechoslovakia.

* * *

Sugar factory for Tunisia[8].—The National Investment Company has decided to finance a beet sugar factory which will be erected in the neighbourhood of Béja.

* * *

Processed food in Ireland[9].—The Irish Sugar Company hopes to undertake the processing of fruits and vegetables and the production of soups in 1960. The fruit will come from existing plantations and the vegetables from the company's peatlands at Gowla. If the initial project works out, operations will be extended to other centres and may include additional forms of processing, such as quick-freezing and dehydration.

* * *

Sugar production in Hawaii.—Sugar production in 1959 was 974,632 tons, the third lowest in ten years, according to the Hawaiian Sugar Producers' Association[10]. Reasons for the low output were long-range effects of the 1958 strike. Production is expected to get back into the neighbourhood of a million tons in 1960 and some plantations have already started crushing the 1960 crop.

* * *

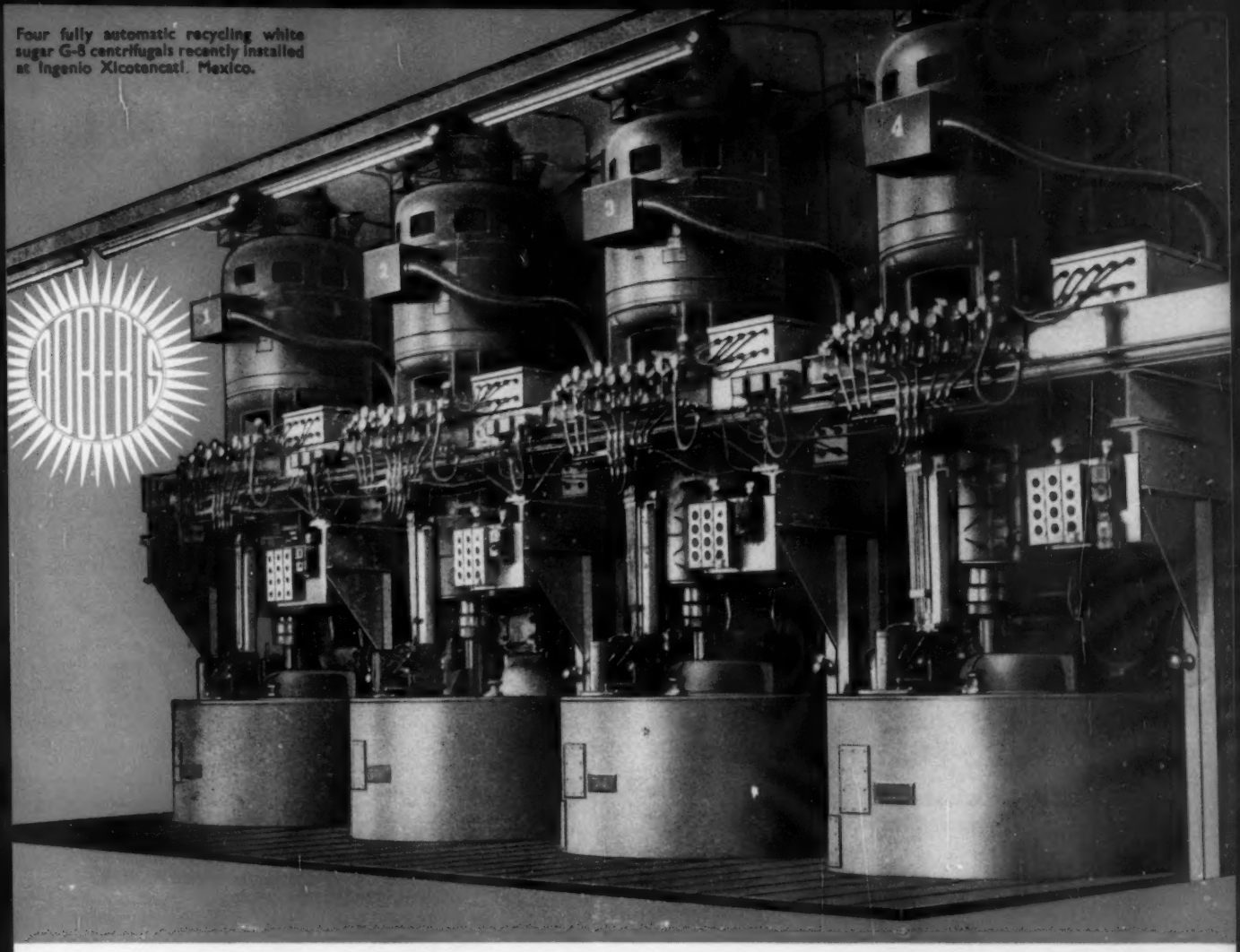
Indonesian sugar crop 1959[11].—Sugar output in Indonesia in 1959 is estimated to amount to 855,695 metric tons, *tel quel*, compared with 769,374 metric tons in 1958.

* * *

U.K. beet prices.—Among the changes announced after the Annual Review of Guaranteed Prices for the farmers of the U.K., is a drop of 2s 6d per ton of sugar beet of 16·5% sugar content, the price for 1960 harvest beet being 128s 0d per ton. This drop is rather greater in proportion than most of the general reductions which lower the total value of the guarantees from £1270 million to £1251 million. No change will take place in the differential of 7s 6d per ton for each 1% above or below 16·5%.

---

[1] *Willett & Gray*, 1960, **84**, 80.
[2] C. Czarnikow Ltd., *Sugar Review*, 1960, (445), 43.
[3] *I.S.J.*, 1960, **62**, 56.
[4] *Public Ledger*, 23rd January 1960.
[5] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 2), 22.
[6] *Zeitsch. Zuckerind.*, 1960, **85**, 37.
[7] *Zeitsch. Zuckerind.*, 1960, **85**, 36 ; F. O. Licht, *International Sugar Report*, 1960, **92**, (1), 4.
[8] *Zeitsch. Zuckerind.*, 1960, **85**, 37.
[9] *Foreign Trade*, 1960, **113**, (2), 21.
[10] *Willett & Gray*, 1960, **84**, 18.
[11] C. Czarnikow Ltd., *Sugar Review*, 1959, (447), 52.



Four fully automatic recycling white sugar G-8 centrifugals recently installed at Ingenio Xicotencatl, Mexico.

2766

A REPEAT!

. . . and an Expansion

Cia Azucarera del Rio Guayalejo, S. A., when built in 1945, was equipped with 23 Roberts Fluid Drive Centrifugals. These are continuing in use and the new automatic G-8 Centrifugals have been added.

This pattern of repeat sales for expansion occurs again and again with users of Western States machines. It confirms their satisfaction with past operations. It attests to their faith in our continuing and fruitful efforts in the field of sugar centrifugation.

If you do not know us, learn to know us. There's a good chance we both would profit.

THE WESTERN STATES MACHINE COMPANY

HAMILTON, OHIO, U. S. A.

TO KEEP THE LEAD — WE THINK AHEAD

Index to Advertisers

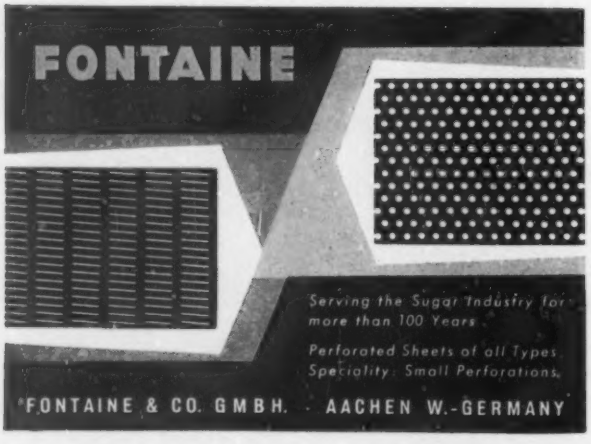
	PAGE
A.P.V. Co. Ltd.	xlviii
Ashworth & Parker Ltd.	xlix
F. W. Berk & Co. Ltd.	l
Blairs Ltd.	Inside Front Cover, xxix
Braunschweigische Maschinenbauanstalt	xxxiii
Brecknell, Dolman & Rogers Ltd.	xxxviii
Thomas Broadbent & Sons Ltd.	i
Broussard Machine Co.	liii
David Brown Corp. (Sales) Ltd.	xvi
Buell (1952) Ltd.	xxii
Cary Iron Works	lvii
George Clark & Son (Hull) Ltd.	vi
Clydesdale Chemical Co. Ltd.	liii
Cochran & Co., Annan, Ltd.	xliii
Cocksedge & Co. Ltd.	xxxix
A. F. Craig & Co. Ltd.	xxxiv
Crofts (Engineers) Ltd.	xl
AB De danske Sukkerfabrikker	xxiv
Dorr-Oliver Inc.	Inside Back Cover
Edwards Engineering Corp.	xii, xiii
Electromagnets Ltd.	ii
Escher Wyss Ltd.	vii
Ewart Chainbelt Co. Ltd.	lii
Farrell-Birmingham Co. Inc.	v
Ferguson Perforating & Wire Co.	lvii
Fisons Pest Control Ltd.	xxvii
Soc. Fives Lille—Cail	viii
George Fletcher & Co. Ltd.	Outside Back Cover
Flexible Drives (*Gilmans*) Ltd.	xlvi
Fontaine & Co.	lii
Goka N.V.	liii
E. Green & Son Ltd.	xxxvii
Gruendler Crusher & Pulveriser Co.	ix
G. M. Hay & Co. Ltd.	x
N. A. Helmer	lii
Hilger & Watts Ltd.	xli
Robert Hudson Ltd.	liv
Hunslet Engine Co. Ltd.	xviii
John King & Co. (Leeds) Ltd.	lv
Kleen-e-zee Brush Co. Ltd.	lvi
Link-Belt Co.	xvii
John McNeil & Co. Ltd.	xxviii
E. C. Masson	lii
Mirrlees Watson Co. Ltd.	iii, xlii
Norit	xliv
Paterson Engineering Co. Ltd.	xlv
Pennine Chainbelt Co. Ltd.	l
Pott, Cassels & Williamson Ltd.	xxxii
Ransomes, Sims & Jefferies Ltd.	xiv
Renold Chains Ltd.	xix
Rotameter Mfg. Co. Ltd.	lv
Sackfilling & Sewing Machine Syndicate Ltd.	iv
Richard Simon & Sons Ltd.	lvi
G. & A. E. Slingsby Ltd.	liv
A. & W. Smith & Co. Ltd.	xxx, xxxi
Sparkler Manufacturing Co.	xlvii
S.P.E.I. Chim.	xlix
Duncan Stewart & Co. Ltd.	xxxv
Stork-Werkspoor N.V.	xi
Strachan & Henshaw Ltd.	xx
Suchar Sales Corporation	xxxvi
Sugar Manufacturers' Supply Co. Ltd.	xxiii, lvii
John Thompson Water Tube Boilers Ltd.	xxi
Watson Laidlaw & Co. Ltd.	xxvi
Western States Machine Co.	li
Yorkshire Imperial Metals Ltd.	xv

FOR BUYERS' GUIDE SEE JANUARY ISSUE pp. xli-liv

SMALL ADVERTISEMENT RATES.

Forty words or under—£1. 10s. 0d. sterling or U.S. $4.00, prepaid. Each additional six words or part thereof—5s. 0d. or U.S. $0.75. Box Number—charged as six words.

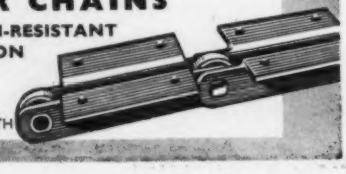
EAST African Sugar producers require urgently qualified Chief Engineer with extensive managerial experience and minimum 10 years in sugar manufacturing. Salary not less than £3000 per annum. Promotion prospects. Write full particulars age, family, experience, positions held, present salary, and when available. Box No. 412, *The International Sugar Journal Ltd.*


FONTAINE
Serving the Sugar Industry for more than 100 Years
Perforated Sheets of all Types
Speciality: Small Perforations
FONTAINE & CO. GMBH. · AACHEN W.-GERMANY

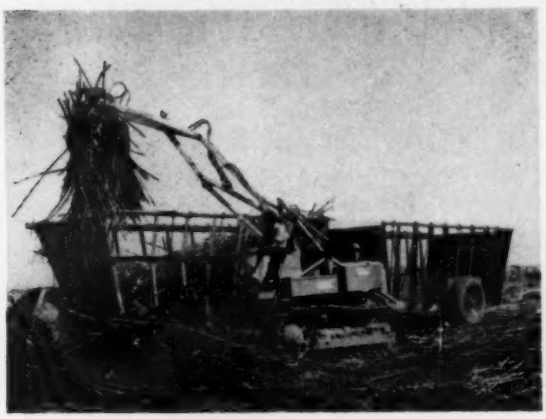
N. A. HELMER
Member A.S.M.E.
CONSULTING ENGINEER
Representing
The Mirrlees Watson Company Limited, Glasgow, Scotland
Pott, Cassels & Williamson Limited, Motherwell, Scotland
POST OFFICE BOX 54—PLAINFIELD, N.J., U.S.A.

WANTED for a large Sugar Factory, East Africa, Chief Engineer, fully qualified, experienced in lay-out, erection, extension, modernization, maintenance and efficient running. Excellent prospects. Apply with full details, copies of testimonials, recent photograph and salary expected to Box No. 413, *The International Sugar Journal Ltd.*

E. C. MASSON Member A.S.M.E.
CONSULTING ENGINEER
CANE SUGAR MILLS & REFINERIES
Engineering & Construction — Improvements & Expansion
FACTORY AUTOMATION
P.O. Box 45-484 MIAMI 45, FLORIDA Telephone:
Cables: NOSSAM U.S.A. Highland 3-3025

EWART CHAINBELT COMPANY LTD. DERBY · ENGLAND
CARRIER CHAINS
IN CORROSION-RESISTANT MALLEABLE IRON
STEEL CHAINS UP TO 140,000 LB. BREAKING STRENGTH


SUGAR CANE LOADERS



Broussard patented "flex-boom" loader mounted on Track-Marshall crawler tractor, with push piler, in Rhodesia.

Capacity 2000 lb/minute (under Louisiana conditions), grab capacity (54 in. opening) 1500 lb., load clearance 12 ft. 11 in., loading radius 10 ft. to 12 ft. boom swing front to right, 100°.

The Broussard heavy duty tropical type loader is now available for installation on the Caterpillar D4, International TD-6, John Deere 440 crawler, Fordson-Major and various U.S.A. wheel Tractors.

Extremely simple in design with few wearing parts, the Broussard loader may be easily installed at the destination on tractors already in hand and quickly removed from the tractor at the close of the harvest.

Manufactured by

BROUSSARD MACHINE COMPANY

ST. MARTINVILLE, LOUISIANA

Export Division

LOGAN PERKINS—SUGAR MACHINERY

International Trade Mart, New Orleans U.S.A.

We have sold our patented

SUGAR TABLET OR CUBE INSTALLATIONS

all over the world.

Cubes from dry granulated

The small machine with the big output!

Very low capital outlay

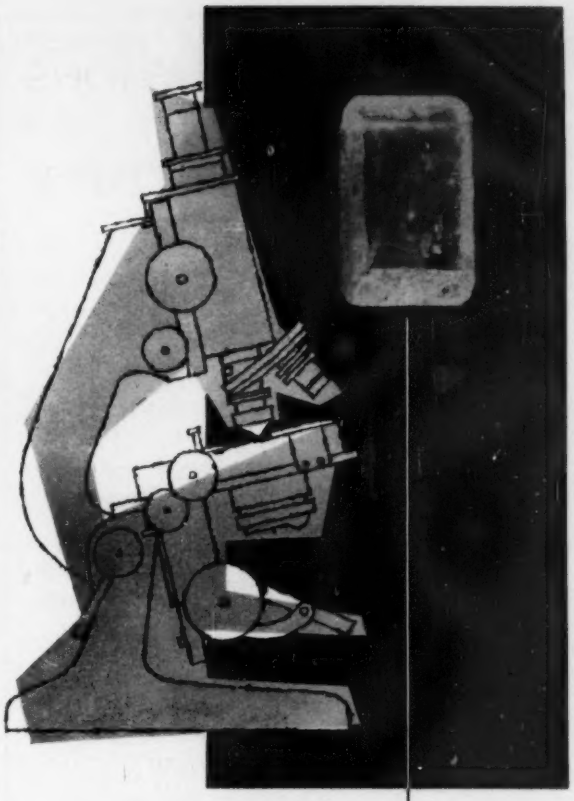
Send for information to:

GOKA N.V.
MACHINE WORKS

Established 21 years

AMSTERDAM
HOLLAND

P.O. Box No. 130
Tel: 222255–222256
Telex: 14173 "Kagodam"



it's CRYSTAL CLEAR...

that Actibon Decolourising Carbon must be **your** first choice for economical and efficient colour removal.

Actibon has been specially developed to meet the needs of the Sugar Industry.

ACTIBON

the highly activated Decolourising Carbon

THE CLYDESDALE CHEMICAL CO. LTD.

SALES OFFICE
142 QUEEN STREET · GLASGOW C.1
Phone: CENtral 5247-8 *Grams: "Cactus" Glasgow*

BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY

By J. EISNER
(Technical Adviser, Booker Bros. McConnell & Co. Ltd.)

This book is intended for use by the men who work in sugar factories and are responsible for the day-to-day operation of plant and process, and who have not the time—or inclination—for studying voluminous textbooks. Of convenient size and style it will be the valued companion of all cane sugar men.

Price: **7s. 6d.** or **$1·00** U.S. post-free.

Obtainable only from *The International Sugar Journal Ltd.*, Central Chambers, The Broadway, London, W.5.

SEMI-ROTARY PUMPS

DOUBLE ACTING TYPE

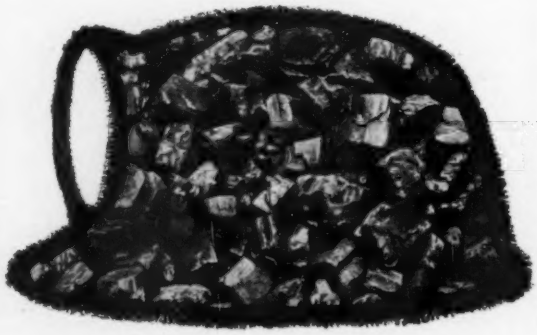
sizes ½" to 3"
Capacities from 150 to 4,200 gallons per hour
In Cast Iron, Brass or Gunmetal

G. & A. E. SLINGSBY LTD.

CLEVELAND STREET

Phone: 20601 (5 lines) HULL *Phone:* 20601 (5 lines)

COAL FIGHTS BACK....



Hudson's experience, gained from mining problems throughout the world, is applied to the manufacture of trucks and other light railway equipment for use in British colleries, in their drive to improve efficiency.

Hudson research and development is continuous and progressive, to the benefit of light railway users everywhere, both above and below the ground.

Hudson
LIGHT RAILWAY MATERIALS

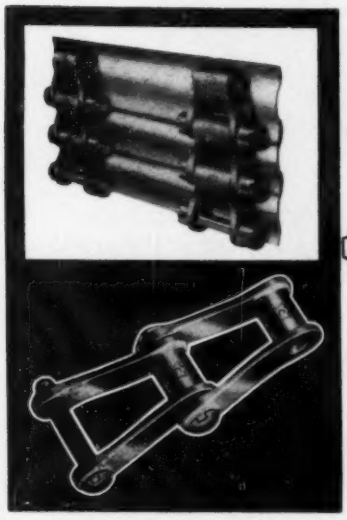
ROBERT HUDSON, LTD., RALETRUX HOUSE, MEADOW LANE, LEEDS.
Telephone: Leeds 20004. *Telegrams:* Raletrux, Leeds.

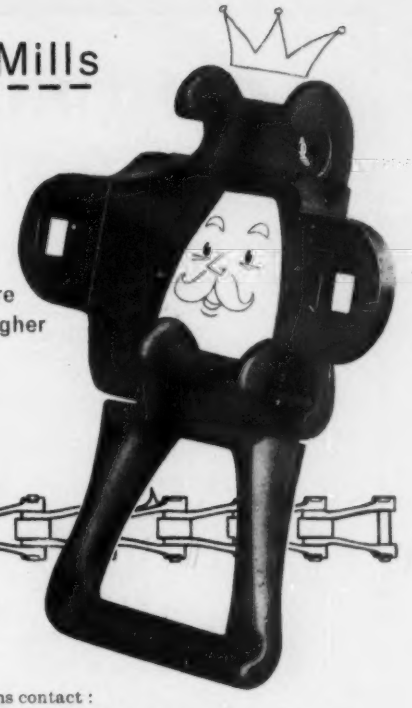
LONDON OFFICE: 30-34, BUCKINGHAM GATE, WESTMINSTER, LONDON, S.W.1. *Works at* LEEDS, BENONI, DURBAN AND CALCUTTA.

Equipment Specialists for Sugar Mills

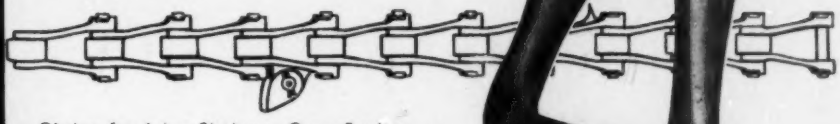
JOHN KING of LEEDS

'Climax' malleable iron has greater comparative resistance to sugar acid corrosion, whilst our special 'Klimal' metal combines this important feature with longer wearing and higher anti-shock qualities.





CARRIER SLATS — *Standard sizes and shapes available for all sugar carrier chains. Close working faces prevent material jamming between slats.*



Chains for Juice Strainers, Cane Feeding Tables, etc., etc.

For details regarding any equipment or information about any special problems contact :

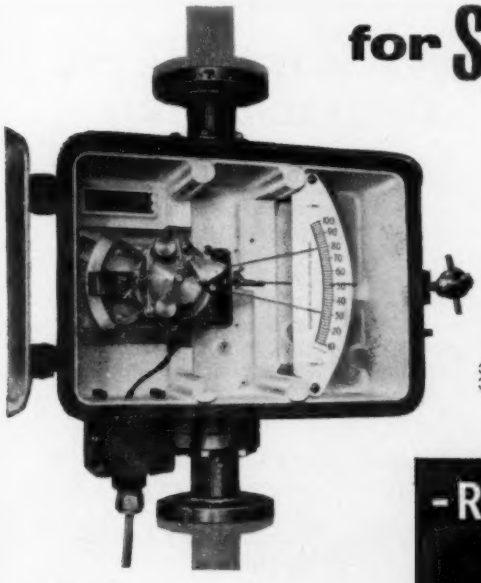
JOHN KING & CO. (LEEDS) LTD. GARNET ROAD, LEEDS 11

Phone: 75414 (4 lines) Grams: Malleable Leeds 11

We can supply Elevators · Conveyors · Hoppers · Bunkers and Buckets of all types

---

for SAFETY in your pipeline

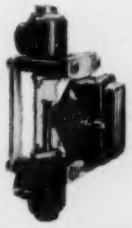


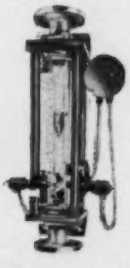
Where a change of liquid or gas flow rate is dangerous then one of these Rotameter flow alarms can be used to provoke attention. Electric or pneumatic signals provide visual or audible alarm.

For details of the instruments shown here, please write for leaflet IS.2010/24.

Type 500A
Electric or pneumatic signal, fully adjustable for liquids or gases.

- Rotameter flow alarms





Type 750 **Metric Series** **Type 825A**

ROTAMETER

FLUID MEASUREMENT AND CONTROL
FLOW-DENSITY-LEVEL

ROTAMETER MANUFACTURING CO. LTD
330 PURLEY WAY, CROYDON, SURREY
Telephone: CROydon 3616

G.24

CONTINUOUS BELT WEIGHER

for weighing whole beets or cossettes

Specially adapted for controlling the speed of cutting mills relative to weight for Continuous Diffusion Plants

Automatic and Sackfilling Weighing Machines

SPECIAL TYPES IN CONSTANT PRODUCTION for

- **RAW SUGAR**
- **REFINED SUGAR**
- **and BEET PULP**

RICHARD SIMON & SONS LTD.

PHOENIX WORKS, BASFORD, NOTTINGHAM

Telephone: 75136-7-8 *Telegrams:* "Balance, Nottingham"

The Famous Kez - Strip Conveyor Belt Brush
Now -
complete in combination with our K·A·M UNIT
Showing the Unit in position ready for action. Micro-adjustable. Flameproof. Anti-static features can be incorporated. Little, if any, guarding required.
INDUSTRIAL DIVISION
THE Kleen-e-ze BRUSH CO. LTD

83 BEVAN LANE, HANHAM, BRISTOL

ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE

For the last 80 years the *ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE* (formerly *Die Deutsche Zuckerindustrie*) has been the authoritative German periodical for sugar technology and sugar economics. Each issue contains several original scientific and practical articles written by expert authors. The articles are prefaced by summaries in English and French. In addition, reports on the technical progress of sugar throughout the world and statistical data of world sugar economy are regularly published.

SAMPLE COPIES WILL BE SENT FREE OF CHARGE ON REQUEST

Yearly Subscription Price : DM30.-

(postage included)

PUBLISHED EVERY MONTH

ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE

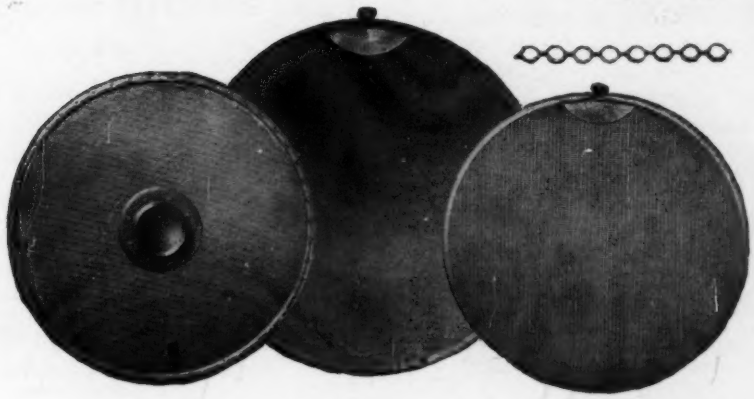
Berlin-Nikolassee, Germany

Lueckhoffstr. 16.

FILTER LEAVES—

WE SPECIALIZE IN ALL TYPES

Tubular Slit



Type 316. Stainless Leaf for Vallez Filter

5-Mesh .080 Stainless

Tubular Slit Stainless Leaf for Sweetland Filters. *Thousands in use.*

Write for our New Catalog

FERGUSON PERFORATING & WIRE CO.

130-140 ERNEST STREET **PROVIDENCE 5, R.I.**

A Suma Product

SUGAR INDUSTRY SLIDE RULES

A slide rule is now available for Table 36 of Spencer & Meade's CANE SUGAR HANDBOOK, 8th Edition (Published by John Wiley & Son, New York) covering Schmitz's Table for Sucrose (Pol) for use in Horne's Dry Lead method with undiluted solutions.

The rule is approximately 11 inches long and is supplied complete with a case.

Sugar Manufacturers' Supply Co. Ltd.
7 & 8, IDOL LANE. LONDON, E.C.3
(Cables : Sumasuco London)

CARY SUGAR CANE HARVESTER–CLEANER–LOADER

The Cary combination Harvester-Cleaner-Loader harvesting extremely recumbent 70 ton per acre cane and loading short lengths (15 in. or 22 in. lengths) into special side dump trailers. Capacity under Florida conditions 250-300 tons per day (cut, cleaned and loaded).

Manufactured by

CARY IRON WORKS
OPELOUSAS, LOUISIANA
(also manufacturers of Cane Trailers and Field Derricks)

Export Division
LOGAN PERKINS—SUGAR MACHINERY
International Trade Mart, New Orleans, U.S.A.

"Brasil Açucareiro"

OFFICIAL ORGAN *of the* BRAZILIAN INSTITUTE OF SUGAR & ALCOHOL
(INSTITUTO DO AÇÚCAR E DO ÁLCOOL)

A MONTHLY MAGAZINE containing complete news and specialized contributions on Brazilian and international sugar agriculture and industry.

Annual Subscription :

Brazil ..... Cr.$100.00
Foreign Countries ..... Cr.$150.00
Single Copies ..... Cr. $10.00
Back Copies ..... Cr.$15.00

Remittances must be made in the name of
INSTITUTO DO AÇÚCAR E DO ÁLCOOL
Praça 15 de Novembro, 42,
Rio de Janeiro,
BRASIL.
Caixa Postal, 420.

THE SOUTH AFRICAN SUGAR JOURNAL

covering the

Sugar Industries of NATAL, ZULULAND, MOZAMBIQUE and EAST AFRICA

Since 1914

The *South African Sugar Journal* has presented planters and millers in the territories for which it caters with authoritative reviews of developments in all fields of sugar cane technology.

FREE SAMPLE COPY SENT ON REQUEST

Subscription and Advertising Rates available from

THE SOUTH AFRICAN SUGAR JOURNAL

P.O. Box 1209

London Assurance House, Smith Street, Durban, South Africa.

Telephone 25612

SUGAR NEWS

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE PHILIPPINE SUGAR INDUSTRY

Published by :

THE SUGAR NEWS PRESS INC.

FEATURES

Results of research and experiments in fields and mills, and other important developments in the Philippine sugar industry of interest both to technical men and laymen ; sugar production, prices, and market news and statistics ; write-ups on other important and allied industries in the Philippines, etc.

SUBSCRIPTION

$7.50 U.S. Currency, per annum, post free *for U.S.A. and its possessions*

$10.00 U.S. Currency, per annum, post free *for other foreign countries*

WRITE FOR A FREE SPECIMEN COPY AND FOR ADVERTISING RATES.

Publishing Office :
417 Dasmariñas, 316 Doña Salud Building,
Manila, Philippines.

CUBA SUGAR YEAR BOOK

New Edition (Spanish-English) containing **SUGAR CENSUS** corrected to date, informative data and alphabetical index of Sugar Mills, giving situation, ownership, year founded, nationality, characteristics, total employees, yield (%), total cane ground, production and export of sugar, molasses, syrups, alcohol, cane brandy, aguardiente, rum.

Also lands owned and leased, colonos, days grinding, record and maps of rainfall, price of sugar and value of crops. Maps of Cuba showing ports, landings, distances, railways, roads, air communications, telegraph, cable and telephone connexions. Graphs with cane and cane products data. Bonded warehouses, taxes, and legislative measures enacted touching the industry.

Directories with over 3000 names and addresses of official and private organizations, business firms, cane growers (Colonos), department heads, producers, shippers, etc.

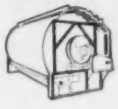
Foreign Section : Sugar production in U.S. and other countries (beet and cane). Imports and distribution of sugar and by-products in U.S. World demand and consumption, quotas, distribution, transport, etc.

$5 post paid

Edited by :

CUBA ECONOMICA Y FINANCIERA
POST OFFICE BOX 2549, HAVANA, CUBA
Teleph. M-3148 Lonja 441-442

Khuzestan

KHUZESTAN FACTORY, IRAN, INSTALLS DORR-OLIVER EQUIPMENT. DORR-OLIVER, N. V. HOLLAND, COOPERATING WITH STORK-WERKSPOOR, CONTRACTOR, FURNISHES 2 RAPIDORR CLARIFIERS,  3 OLIVER-CAMPBELL FILTERS.

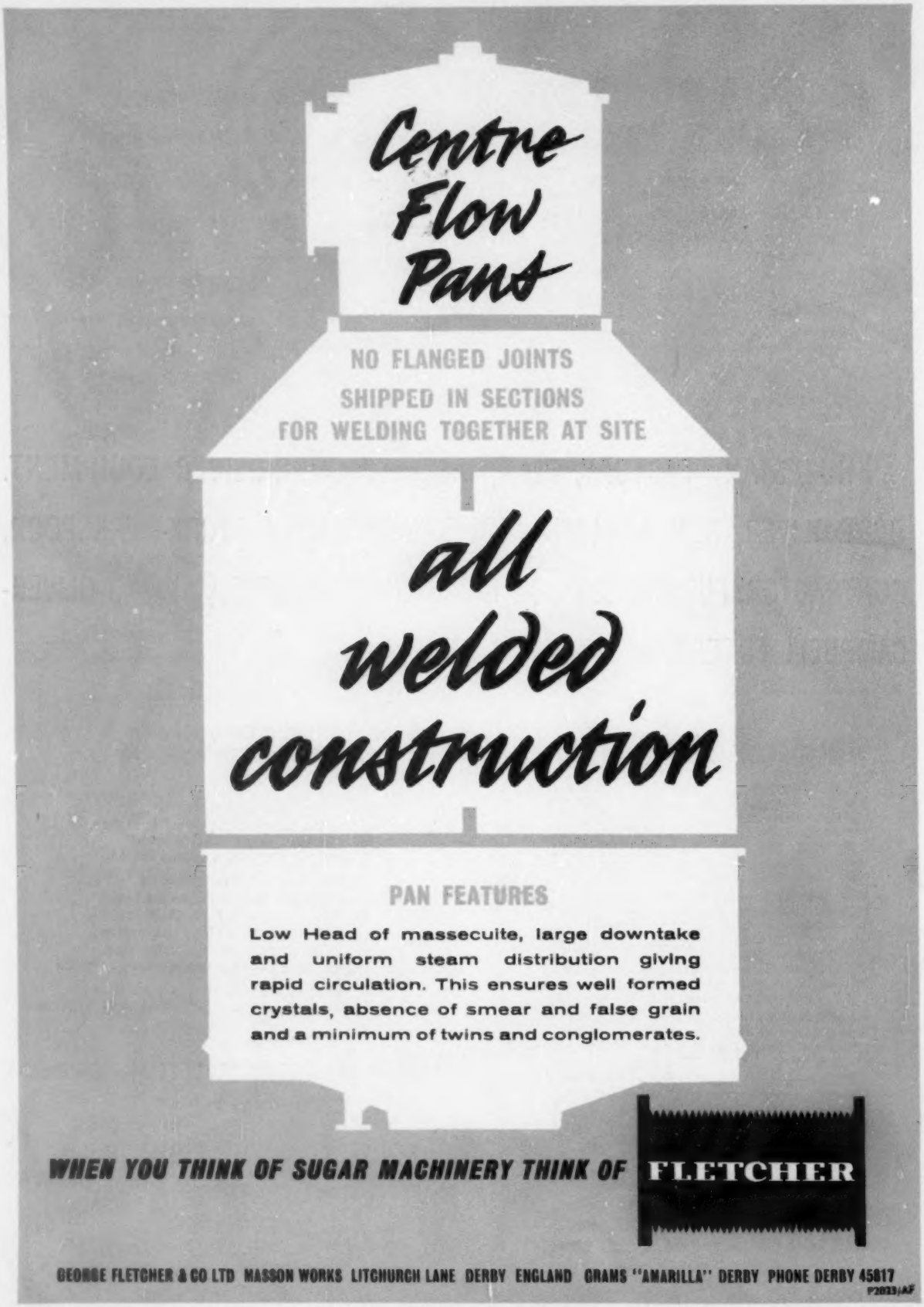
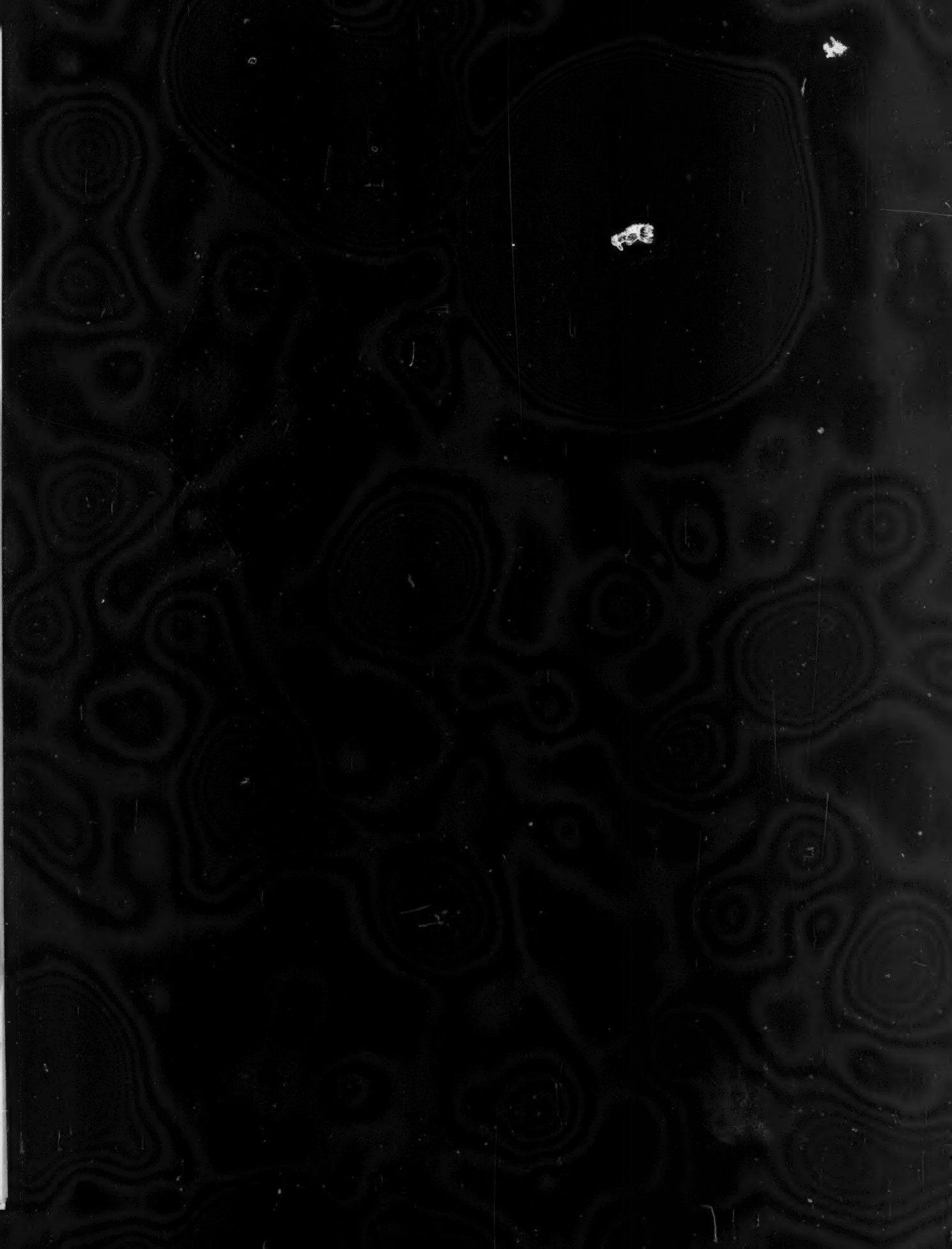
These are the world-wide facilities of the Dorr-Oliver organization:

Dorr-Oliver Companies
Australia, Belgium, Canada, France, Germany, Great Britain, India, Italy, Netherlands, United States

Dorr-Oliver Representatives
Argentina, Brazil, British Guiana, Colombia, Costa Rica, Cuba, Hawaii, Jamaica, Japan, Mauritius, Mexico, Philippines, Portugal, Puerto Rico, Reunion, South Africa, Spain, Venezuela

Write to Dorr-Oliver, Stamford, Conn. for the name of your nearest representative.

Available Universally . . . . . DORR-OLIVER SUGAR PROCESSING EQUIPMENT


Centre Flow Pans
NO FLANGED JOINTS
SHIPPED IN SECTIONS
FOR WELDING TOGETHER AT SITE
all welded construction
PAN FEATURES
Low Head of massecuite, large downtake and uniform steam distribution giving rapid circulation. This ensures well formed crystals, absence of smear and false grain and a minimum of twins and conglomerates.
WHEN YOU THINK OF SUGAR MACHINERY THINK OF
FLETCHER
GEORGE FLETCHER & CO LTD MASSON WORKS LITCHURCH LANE DERBY ENGLAND GRAMS "AMARILLA" DERBY PHONE DERBY 45817
P2023/AF

Printed by JOHN ROBERTS & SONS, Salford, Manchester; and published by the Proprietors, THE INTERNATIONAL SUGAR JOURNAL LTD., at Central Chambers, The Broadway, London, W.5. Entered at the New York Post Office as Second-Class Matter. Registered for transmission by Canadian Magazine Post.
PRINTED IN GREAT BRITAIN.